

**Version**

**1.0**

CITY OF GAITHERSBURG

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Small Unmanned Aircraft System (sUAS) Program



*Gaithersburg*

# Field Guide

CITY OF GAITHERSBURG

# **sUAS Field Guide**

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Produced for the City of Gaithersburg, Maryland by:

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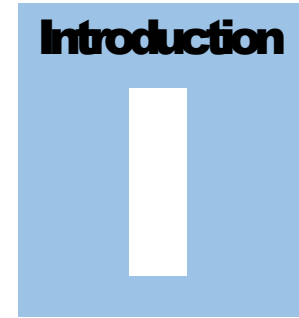
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## Introduction

This document provides field guidance for the overall conduct for the small unmanned aircraft system (sUAS, or drone) program. This guide incorporates material from the City of Gaithersburg documents listed below.

- sUAS Flight Operations Manual
- sUAS Maintenance Program
- sUAS Training Program

This guide is intended to provide a quick and easy reference for crews operating in the field. If anything in this guide contradicts the original equipment manufacturer (OEM), the OEM’s guidance shall take precedence.

Gaithersburg is dedicated to highly professional flight operations. Safety is always the first priority, and the sUAS team will be persistent in continuously demonstrating an effective program. Even though there are recommended procedures within this guide, they are not a substitute for sound judgment. Situations affecting the lives and property of others may require deviation from the recommended procedure.

This manual provides the minimum requirements based on recognized best practices and standards for the sUAS category as defined by the Federal Aviation Administration (FAA). This program recognizes compliant sUAS operations includes obeying laws and will adhere to applicable local and state laws.

All flight crew are to be familiar with this guide and related program documents and are to comply with its provisions. Changes to the guide will be promptly disseminated to all personnel.

This document was prepared to support an organization operating sUAS under 14 Code of Federal Regulations (CFR) Part 107.

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- Shall vs. should vs. may vs. will — each of these implies specific requirements:
- Use of the word *shall* implies that a procedure or statement is mandatory and must be followed to comply with this standard. Since *shall* statements are requirements, they include sufficient detail needed to define compliance.
- *Should* implies recommended. *Should* statements are provided as guidance towards the overall goal of improving safety and could include only subjective statements.
- *May* implies optional at the discretion of the manufacturer, or operator. *May* statements are provided to clarify acceptability of a specific item or practice, and offer options for satisfying requirements.
- *Will* implies compliance with future, not yet realized activities or events.

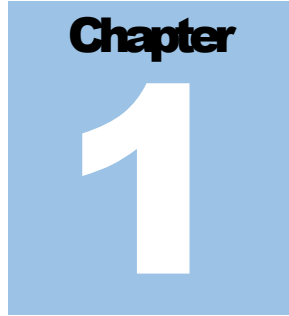


## Record of Changes

Changes are promulgated as required by the Manager, Chris Clifford, Television Productions Manager, Department of Community and Public Relations and are issued to each document holder. Each amended page shall record the appropriate amendment number and date.

It is the responsibility of the document's holder to insert all amendments issued to him/her in a timely manner.

Number	Date	Date Inserted	Entered by
Original Issue			



## Organization

**1** The City of Gaithersburg City Manager, hereafter known as “Executive”, retains ultimate authority for the conduct and operation of the sUAS program. The Executive has delegated authority to the Manager, Chris Clifford, Television Productions Manager, Department of Community and Public Relations for daily program management and execution.

### 1.1 Remote Pilot-in-Command (RPIC)

The RPIC of a flight is directly responsible for, and is the final authority for the safe and effective operation of the sUAS. Deviation from specified flight and operating instructions is only authorized during an in-flight emergency situation when, in the judgment of the RPIC, safety justifies such action. Responsibility for starting or continuing flight with respect to weather or any other condition affecting the safety of the sUAS rests with the RPIC. Only organizational designated RPICs may operate sUAS or supervise the person manipulating the controls.

- Requirements
  - City Employee
  - Current FAA Remote Pilot certificate with sUAS Rating
  - Organizationally designated as a RPIC
- Duties
  - Comply with federal, state, and local regulations and laws as well as all applicable City policies
  - Support approved missions
  - Supervise personnel that manipulate the controls
  - Perform responsibilities as delegated by the Manager

### 1.2 Person Manipulating the Controls

The person manipulating the controls is a person who has not been designated a RPIC. This individual may operate the sUAS as long as he or she is directly supervised by a RPIC, and the RPIC has the ability to immediately take

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direct control of the sUAS. The person manipulating the controls must be an employee and been approved by the Manager.

**1.3 Visual Observer (VO)**

The VO is responsible to the RPIC for ensuring the sUAS does not operate in unsafe proximity to any manned air traffic or other hazards. VOs are required for all missions unless waived by the Manager.

- Requirements
  - City Employee
  - Organizationally designated as a VO
- Duties
  - Communicate sUAS location, attitude, altitude, and direction of flight.
  - Communicate the position of other aircraft or hazards in the airspace.
  - Communicate the determination that the sUAS does not endanger the life or property of another.
  - Support approved missions

**1.4 Camera Operator (CO)**

The CO is responsible for operating the camera installed on the aircraft. CO's are optional crewmembers. The CO responds to the RPIC regarding issues of safety.

- Requirements
  - City Employee
  - Organizationally designated as a CO
- Duties
  - Coordinate with RPIC on camera direction and data collection goals
  - Support approved missions
  - Support data management

## Safety

**2** Safety is the program’s highest priority with zero incidents as the primary goal. The application of personal and team management safety concepts helps enhance the safe operation of the sUAS, both on the ground and in the air.

**2.1 Personnel Safety** The RPIC has overall responsibility for the safe, orderly flight of the sUAS. To mitigate risk to personnel:

- Always operate in the safest manner possible
- Never take unnecessary risks
- Recognize that safe does not mean risk free

RPIC shall hold all crew members accountable and responsible for the identification and management of risk. RPIC will also be responsible for following City safety policy.

### 2.2 Battery Safety

Lithium-polymer (LiPo) batteries can pose a safety hazard because they contain a flammable electrolyte and are pressurized. Do not use batteries that are damaged, cut, puffy, or physically abnormal. All LiPo batteries shall be handled in accordance with the manufacturer’s recommendations. At the end of serviceable life, qualifying batteries shall be disposed at an authorized collection facility.

### 2.3 Safe Battery Charging

LiPo batteries offer normal charging performance at cooler temperatures and may even allow fast charging within a temperature range of 41°F to 113°F (5°C to 45°C). Consumer-grade LiPo batteries should not be charged at temperatures below 32°F (0°C). If overheated or overcharged, LiPo batteries may suffer “thermal runaway”, to include a cell rupture, and in extreme cases combustion can occur. Batteries should not be left unattended when charging or near flammable objects.

## **2.4 Battery Transport**

LiPo batteries can be transported in manufacturer provided cases, or, containers capable of containing free liquid. The battery holder should be securely fastened and the battery protected in such a manner as to prevent damage and short circuits. Travel via commercial airlines will require advanced research to determine if the LiPo battery is permitted onboard the aircraft.

## **2.5 Propeller Safety**

Coming in contact with a spinning propeller on an unmanned aircraft (UA) could result in substantial harm. Typically, before getting airborne, you must arm the sUAS' flight controller and place the sUAS in a ready-to-fly state. Movement of the UA can cause the propellers to automatically start spinning to try to stabilize the device, potentially resulting in injury.

## **2.6 Crew Rest and Endurance**

Proper management of crew rest and endurance contributes to overall aviation safety, mission accomplishment, and efficiency. If a crew member is unable to perform his/her duties due to fatigue, or other factors, the RPIC, Manager, and Chief RPIC should be the final decision makers on whether the mission should be performed/completed. However, any field team members have stop-work authority if they feel unsafe. The following guidelines should be used for crew endurance limits.

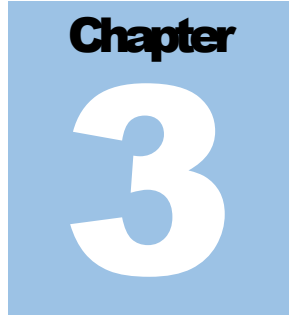
- Maximum duty period of 10 hours
- Minimum 10 hours' rest between duty days
- Maximum 12 consecutive duty days

## **2.7 Risk Management**

The safety level of missions performed by personnel is enhanced through risk identification and mitigation processes. This is accomplished through:

- Hazard identification and analysis
- Risk assessment and mitigation

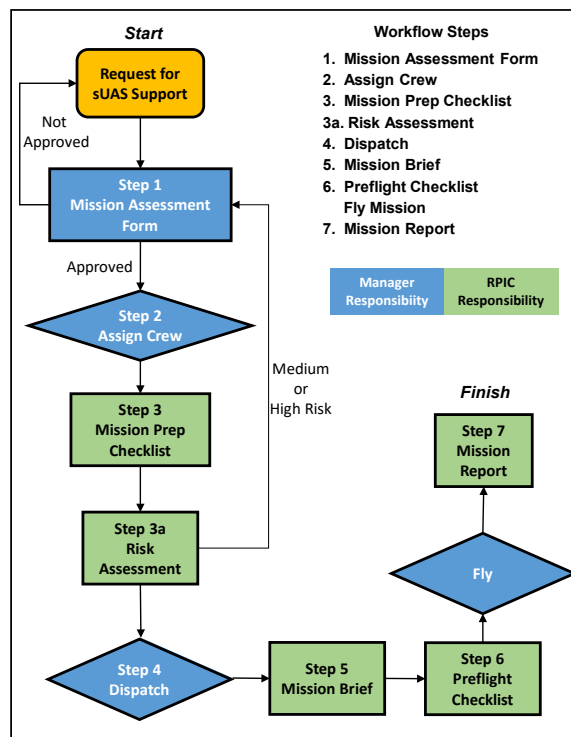
Every member of the program must understand their role in identifying, reporting and mitigating hazards.



## Mission Planning

**3** Mission planning activity is conducted by the RPIC prior to takeoff to ensure that the flight will be conducted safely and in accordance with all applicable standards and regulations. The activity includes, but is not limited to, such things as checking weather, airspace analysis, equipment configuration, identifying crewmembers, and notifying property owners.

**3.1 Mission Workflow** The Manager shall designate a RPIC and a VO for each flight. Only the Manager can waive the requirement for a VO. Once a flight is authorized by the Manager, the RPIC may commence mission planning activities as depicted below.



### **3.2 Mission Workflow Steps**

It is imperative that constant and open communication occurs during all phases of the Mission Workflow.

- **Step 1:** Complete Mission Assessment Form (Manager), see Appendix 1. If the Manager approves the request for sUAS support, proceed to Step 2. If disapproved, the Manager notifies organization or person their request for support was denied.
- **Step 2:** Assign crew (Manager) from Personnel List, see Appendix 2.
- **Step 3:** Complete Mission Prep Checklist (RPIC), see Appendix 3
- **Step 3a:** Complete Risk Assessment (RPIC), see Appendix 3a. If risk is assessed as Medium or High, contact Manager to review before proceeding.
- **Step 4:** Dispatch (Manager), see Appendix 4 for contact information.
- **Step 5:** Complete Mission Brief (RPIC), see Appendix 5.
- **Step 6:** Complete Preflight Checklist (RPIC). See Appendix 6.

#### **\*\*\*Fly Mission\*\*\***

- **Step 7:** Submit a Mission Report (RPIC), see Appendix 7.

### **3.3 Authorized Uses for sUAS**

Only authorized missions listed in Appendix 8 shall be flown. Absent exigent circumstances, new missions that are not on authorized list, may not be flown until approved by the Manager.

### **3.4 Weather and Night Operations**

Prior to commencing flight operations, the RPIC must ensure all weather conditions will support safe and compliant operations that adhere to local, state, and federal laws and regulations The RPIC must ensure that the available weather information indicates that the meteorological conditions will permit flight under the following conditions:

- Minimum weather visibility is 3 statute miles from control station.
- Aircraft must remain 500 feet below and 2000 feet horizontally from clouds.

Operations are not permitted at night, which is defined as the hours between end of evening civil twilight to beginning of morning twilight, unless approved with a FAA waiver.

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### **3.5 Property Access**

RPIC's may need to obtain permission before conducting flight operations, to include the following:

- Government
- Private property owners

In some instances, verbal permission is acceptable, otherwise written permission forms will be maintained at the mission site until flight operations are completed and should be maintained per organization policy. See Appendix 9 for the Property Access form.

### **3.6 Airspace**

The RPIC shall conduct an analysis of the airspace before flight operations. Operations are restricted or prohibited without additional permissions or waivers in the following areas:

- Above 400 feet AGL
- Airports with controlled Class B, C, D, or E airspace
- Special Use Airspace which includes Restricted and Prohibited areas
- Temporary Flight Restriction
- Special Flight Rules Area
- Special Security Instruction Areas

#### **3.6.1 Airspace Tool**

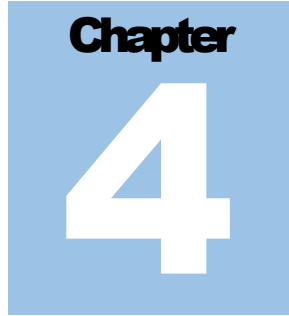
There are several technologies to help assess airspace, to include the FAA's partner web site, "Know Before You Fly" (<http://knowbeforeyoufly.org/airspace-map/>) and its companion mobile app.

#### **3.6.2 NOTAMS**

RPIC's are required to comply with all existing Notice to Airman (NOTAM) regardless of the type of UAS operation, per federal regulations. NOTAM information may be accessed at [www.pilotweb.nas.faa.gov/PilotWeb](http://www.pilotweb.nas.faa.gov/PilotWeb), or calling Flight Service at 1-800-992-7433.

#### **3.6.3 Takeoff and Landing Area**

Multicopters or vertical lift aircraft have minimal requirements for takeoff and landings. Consider proximity to hazards such as power lines, trees, people, and vehicular traffic. Other factors include locating a level and debris free ground.



## Operations

**4** This document supports an organization operating sUAS under 14 CFR Part 107, which is summarized in Appendix 10.

### 4.1 Operational Control

Operational control is defined as the exercise of authority over the preparation with respect to the flight of sUAS, using a three-level system.

- Level 1: City of Gaithersburg City Manager, retains ultimate authority for the conduct and operation of the sUAS program.
- Level 2: The sUAS Manager, controls the daily routine and no flight is undertaken unless it is approved by the Manager.
- Level 3: The RPIC.

### 4.2 Flight Watch

Current information on the location of sUAS is maintained by the Chief RPIC at all times or his or her designee. The RPIC will ensure that first takeoff and last landing for the mission is communicated to the Manager.

### 4.3 Aircraft Logs

All flight operations require record keeping. Data taken during flight mission is cataloged and recorded according to the prevailing regulations and laws of the state. Flight data recording is saved and assessed for safety implications, efficiency adjustments, and privacy protection. See Appendix 11.

### 4.4 Privacy

Privacy is a key priority of the City sUAS program. The sUAS program participants shall adhere to guidance described in Appendix 12 sUAS Data and Good Neighbor Policy during sUAS operations that can, or have the potential to, capture, store, transmit, and/or share data, including audio, video, visual images, or other personally identifiable information which may include the time, date, and geographic location where the data were captured.

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#### **4.5 Medical Condition**

Personnel may not participate in the operation of a sUAS if they know or have reason to know that they have a physical or mental condition that could interfere with the safe operation of the sUAS.

#### **4.6 Training**

All qualification and training requirements are described in the organization's Aircrew Training Program.

#### **4.7 RPIC Proficiency**

Prior to conducting missions, RPICs must have made, within the previous 90 days, a minimum of three takeoffs and landings in the same sUAS category (e.g., quad copter, fixed wing, etc.).

#### **4.8 Air Traffic Control (ATC) Communications**

The RPIC must comply with FAA directed communications plan and per FAA requirements when stipulated. Most 14 CFR Part 107 operations do not require ATC communications.

#### **4.9 Inter-Communication Requirements**

Any VO, CO, or other person charged with providing see-and-avoid assistance must have immediate direct voice communication with the RPIC. When the RPIC pilot is in communication with ATC, monitoring of the ATC frequency by all sUAS crew is required for shared situational and navigational awareness. However, unless it is approved for others to do so, the RPIC is the only crewmember that will communicate with ATC.

#### **4.10 Minimum Crew Composition for UAS Operations**

The minimum crew shall consist of a RPIC and at least one other crewmember performing the duties of a VO, unless waived by the sUAS Manager.

#### **4.11 Electronic Devices**

The use of electronic devices, such as cellular phones, other than for sUAS mission-required usage shall be avoided so as not to interfere with the sUAS operation.

##### **4.11.1 Flight Area Boundaries**

During the mission, the sUAS shall remain in controlled flight, within the designated boundary as defined by the RPIC, and within regulations. During autonomous operations, any sUAS appearing uncontrolled or moving beyond the boundary limit is subject to immediate manual override. Failure of manual override will result in flight termination.

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Aircraft location and altitude will be displayed in real-time with respect to the boundaries and approved altitude limits; this is a prerequisite for any flight that is flown autonomously.

**4.11.2 Sterile Cockpit**

The RPIC will ensure nonparticipating persons do not interfere with safe operations to include maintaining a sterile, distraction free, sterile cockpit for the RPIC.

**4.11.3 Precipitation**

Unless the manufacturer specifications state otherwise, sUAS are not water proof and flight in precipitation (rain or snow) may result in aircraft damage and ultimately unsafe flight characteristics.

**4.11.4 Cold Weather**

Cold temperatures will affect equipment and the operators controlling the sUAS. Freezing temperatures will adversely impact LiPo batteries found on most sUAS today, reducing their available power output. LiPo batteries may require special handling (warming) before use to ensure the internal chemical reaction provides the expected power output. Operators may find controlling the aircraft with gloved hands cumbersome, with reduced tactile feeling through their fingers that hinders switch movement. Crews shall prepare in advance before the first cold weather operation to ensure appropriate personal gear, equipment handling, and procedures are established.

Where frost, ice, or snow exists, the RPIC shall not commence a flight unless the aircraft has been inspected to determine whether any frost, ice, or snow is adhering to the critical surfaces as defined. Such inspection shall be carried out by the RPIC.

When any frost, ice, and/or snow are found adhering to any critical surface, the contaminant will be removed completely before any flight is attempted. If a clean aircraft cannot be assured, the only acceptable alternative is to cancel or postpone the flight until conditions are acceptable.

No RPIC shall commence a flight in or continue a flight into known or expected icing conditions where the formation of ice on the aircraft may adversely affect the safety of the flight.

**4.11.5 Maritime Operations**

Operations over water is permitted, however, launch and recovery from a vessel that is underway requires sUAS Manager approval.

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#### **4.11.6 Inflight Battery Power Minimum**

Flight planning should always allow for executing an entire mission and landing with at least 25 percent reserve battery capacity. RPICs shall not operate sUAS below 25 percent battery reserve.

#### **4.11.7 Night Vision Technology**

Night vision technology is permitted; however, any night time sUAS operations requires a FAA waiver before they can take place.

#### **4.11.8 Fire Extinguishers**

Fire extinguishers, appropriate for the types of hazards encountered, shall be readily available, consistent with laws and regulations. All personnel shall be properly trained on the proper use of the equipment.

#### **4.11.9 Operations from a Moving Vehicle**

With prior approval from the sUAS Manager, the RPIC may operate the sUAS from a moving land or water-borne vehicle over a sparsely-populated area. However, operation from a moving aircraft is prohibited.

#### **4.11.10 Visual Line of Sight (VLOS) Operation**

The RPIC and person manipulating the controls must be able to see the sUAS at all times during flight. Therefore, the sUAS must be operated closely enough to the control station to ensure visibility requirements are met during operations. This requirement also applies to the VO if used during the aircraft operation. VLOS must be accomplished and maintained by unaided vision, except vision that is corrected by the use of eyeglasses (spectacles) or contact lenses. "Daisy chaining" VO's is not permitted.

#### **4.11.11 Remaining Clear of Manned Aircraft**

The RPIC has a responsibility to operate the aircraft so it remains clear and yields to all manned aircraft.

#### **4.11.12 Minimum Standoff Distances and Maximum Altitudes**

Regulations prohibit flying a sUAS directly over a person who is not under a safe cover, such as a protective structure. However, a sUAS may be flown over a person who is directly participating in the operation of the sUAS, such as the RPIC, other person manipulating the controls, a VO, or crewmembers necessary for the safety of the sUAS operation, as assigned and briefed by the RPIC. A stationary vehicle is considered safe cover, while a moving vehicle is not considered safe shelter.

Although not stipulated by the FAA, for organizational operations the minimum aircraft standoff from people is 10 feet laterally.

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#### **4.11.13 Transportation of Property**

With prior approval from the sUAS Manager, the RPIC may transport property (e.g., medical supplies) with the sUAS. These operations must be conducted in compliance with regulations.

#### **4.11.14 Prohibiting Arming sUAS**

Organization sUAS are prohibited from attaching or deploying weapons of any kind from the aircraft.

#### **4.11.15 Wind Limitations**

In the absence of manufacturer's guidance, the sUAS Manager shall establish wind limitations appropriate for the intended sUAS mission and known aircraft operating parameters. When no limitations exist, the max sustained wind limit is 25 knots.

Operations in winds greater than the above shall require the sUAS Manager's approval.

#### **4.12 Required Documents**

All missions shall dispatch with the following required documents.

- This Field Guide
- sUAS Manufacturer Flight/Operations Manual
- Remote Pilot Certificate for RPIC
- FAA airspace authorizations/waivers (if applicable)

#### **4.13 Aircraft Weight and Balance**

The RPIC is responsible for the proper loading, including load security, weight, and weight distribution. The load shall be distributed to ensure that the center of gravity will remain within the prescribed limits throughout the entire flight.

#### **4.14 Checklists**

Unless otherwise provided by the manufacturer, supplemental checklists have been established for sUAS operations. Each checklist contains the date of the last revision. Every crewmember shall follow the checklist in the performance of their assigned duties.

#### **4.15 Special Operations**

Special operations, defined as missions not conducted on a routine basis, shall be thoroughly evaluated to ensure that the operation does not exceed the capabilities of the sUAS program. Each special operations mission should be evaluated to determine if specific procedures, training and/or equipment are in place to accomplish the mission. Special operations missions shall not be authorized until all of these requirements have been met and the sUAS Manager approves.

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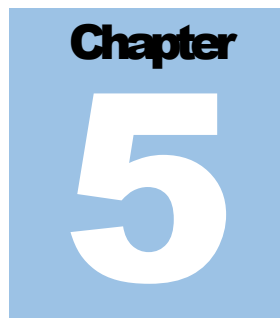
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## Emergency Procedures

**5** Even though there are recommended procedures within this guide, they are not a substitute for sound judgment. Situations affecting the lives and property of others may require deviation from the recommended procedure.

**5.1 Accident Reporting** Per the federal regulations at 14 CFR Part 107, an accident report must be made within 10 calendar-days of the operation that created the injury or damage as defined below:

- Serious injury: if a person requires hospitalization, but the injury is fully reversible. Including, but not limited to, head trauma, broken bone(s), or laceration(s) to the skin that requires suturing.
- Damage to any property, other than the small AV, if the cost is greater than \$500 to repair or replace the property (whichever is lower).

The report may be submitted to the appropriate FAA Regional Operations Center (ROC) electronically or by telephone. Reports may also be made to the nearest jurisdictional FSDO. See Appendix 13 for Incident Report guidance.

### 5.2 Abnormal Procedures

When provided, crews should adhere to manufacturers procedures and use the following as supplemental guidance. If the manufacturer provided no guidance, then crews may tailor the following to satisfy organizational requirements.

#### 5.2.1 Lost Link

Lost Link occurs when there is a loss of command and control link between the control station and sUAS. One outcome is the sUAS performs a Lost Link Procedure per design specifications established in the aircraft operator's manual and as planned during preflight, such as an autonomous return-to-home.

1. *Verify Lost Link – RPIC*

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2. *Announce “Lost Link” to crew – RPIC*
3. *Attempt to regain link (cycle power, switches, antenna) – RPIC*
4. *If link regained, continue at RPIC discretion*
5. *If link not gained, monitor Lost Link Procedure, prepare for recovery – RPIC*
6. *Assist with preparing landing area - VO*

**5.2.2 GPS Failure**

GPS is not required for safe flight, but does enable many features that increase aircraft flight stability and enables flight automation. Most systems provide warning signals to alert when there is a loss of GPS.

1. *Upon receiving an alert, or observing no GPS for more than 10 seconds, proceed with manual flight control and land – RPIC*
2. *Announce loss of GPS to crew - RPIC*

**5.2.3 Fly-Away**

Fly-away is an interruption or loss of the control link, or when the pilot is unable to effect control of the aircraft and, as a result, the sUAS is not operating in a predictable or planned manner. In event of a fly-away, the pilot and flight crew and team shall make every effort to reestablish control of the sUAS and land it as soon as possible. Information on location, direction of travel, altitude, and expected vehicle behavior will be relayed to all appropriate authorities.

1. *Attempt changing flight modes to regain control – RPIC*
2. *Announce Fly away to crew – RPIC*
3. *Notify ATC as required – RPC*
4. *Assist with tracking last known course and speed - VO*
5. *Attempt recovery - RPIC*

**5.2.4 Loss of Control**

Loss of control may be the result of mechanical, software, or battery related problems that adversely affect flight characteristics and result in out-of-control flight.

1. *Attempt to regain control and land – RPIC*
2. *Announce loss of control – RPIC*
3. *Assist in clearing all personnel from area - VO*

**5.2.5 In-Flight Fire**

1. *Land immediately in safe area away from personnel – RPIC*

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2. *Locate and use fire extinguisher – VO*
3. *Contact fire department (if required) - RPIC*

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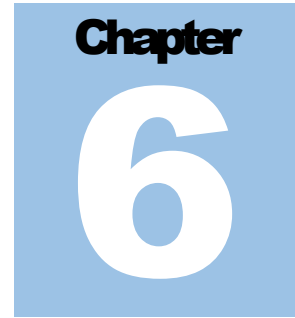
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## Maintenance

**6** The airworthiness of sUAS must be assured and is dependent upon scheduled maintenance, thorough inspections and timely correction of discrepancies. Maintenance for sUAS includes scheduled and unscheduled overhaul, repair, inspection, modification, replacement, and system software upgrades of the sUAS and its components necessary for flight. A full description of maintenance can be found in the Maintenance Program documents.

**6.1 Preflight** During preflight inspection, the RPIC may discover that a component is in need of servicing, repair, modification, overhaul, or replacement outside of the scheduled maintenance period as a result of normal flight operations or resulting from a mishap. In addition, the sUAS manufacturer or component manufacturer may require an unscheduled system software update. In the event such a condition is found, the RPIC should not conduct flight operations until the discrepancy is corrected.

**6.2 Field Maintenance**  
Should a component, such as a propeller, require replacement, a crewmember can perform the replacement in the field. When there is any damage beyond the in-field repair capability, the sUAS is grounded until repairs are incorporated. Organization shall adhere to manufacturer’s recommendations for maintenance tasks to be performed by the manufacturer or by a person or facility specified by the manufacturer.

**6.3 Maintenance Record**  
Complete, up to date, maintenance records shall be kept of all maintenance activities performed on sUAS, to include the engines, propellers, components, software, and systems, in accordance with appropriate maintenance processes, policies, and procedures. Maintenance records shall without exception be completed each time a sUAS airframe, engine, propeller, system, or component is repaired following a reported discrepancy. These records shall reflect the history and current disposition of such airframe, engine, propeller, system, and component. See Appendix 14 Maintenance Records.

**6.4 Maintenance Schedule**

In the absence of a manufacturer provided schedule, Appendix 15 Maintenance Schedule provides recommended guidance.

**6.5 Operational (Functional) Flight Check**

All designated RPICs are qualified to perform an operational flight check or return to service test flight to validate the maintenance that was performed and ensure that the results of the test flight are documented in the appropriate maintenance records.

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# Mission Assessment

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**sUAS Mission Assessment**

**Requesting organization name and point of contact:**

**Is mission on approved list?**

**Type of services requested?**

**Mission date?**

**Mission location (address or lat/long)?**

**Mission area dimensions?**

**Mission flight duration?**

**Does it comply with regulations and laws?**

**Does it require permission to access private property?**

**Is data processing required?**

**Will there be media interest?**

**MISC:**

	Approved		
	Yes	No	
<b>Lead Remote Pilot *</b>			
<b>Safety Manager*</b>			
<b>Manager</b>			<b>* Optional</b>



# Mission Prep Checklist

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sUAS Mission Prep				
Status		Item	Action	Notes
	1	Batteries	Charge	
	2	Controller battery	Charge	
	3	Camera battery*	Charge	
	4	Memory card	Remove stored data	
	5	Verify software	Confirm firmware	
	6	Airspace assessment	Consult aeronautical charts and NOTAMs	
	7	Terrain assessment	Review terrain and obstacles	
	8	Issue NOTAM*	Issue a NOTAM if required	
	9	Notification	Local authorities*	
			Airport*	
	10	Property access	Coordinate permission to enter property	
	11	Documents	Verify	
	12	Support equipment*	Fire extinguisher, tables, chairs, chargers, generator, etc.	
	12	PPE*	Confirm what, if any, personal protective equipment is needed	
	14	Weather	Check forecast	
	15	Medical	Locate nearest medical facility	
	16	Crewmembers	Confirm crewmembers	
	17	Risk Assessment	Complete	* If applicable

# Risk Assessment Form



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sUAS Risk Assessment Form			
Hazard	Likelihood	Consequence	Risk Score*
<i>Example: sUAS impacts ground object</i>	2	2	Low
1			
2			
3			
4			
5			
6			
* Medium and High risk scores require Manager's Review			

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Severity Likelihood	Negligible 1	Minor 2	Major 3	Hazardous 4	Catastrophic 5
	Frequent 5	Occasional 4	Remote 3	Improbable 2	Extremely Improbable 1
High Risk		* Unacceptable with Single Point and/or Common Cause Failures			
Medium Risk					
Low Risk					

Severity of Consequence			Likelihood of Occurrence		
Severity Level	Definition	Value	Likelihood Level	Definition	Value
Catastrophic	Equipment destroyed, person killed	5	Frequent	Likely to occur many times	5
Hazardous	Large reduction in safety margins. Serious injury to a person, requires hospitalization. Major equipment damage.	4	Occasional	Likely to occur sometimes	4
Major	Significant reduction in safety margins. Serious incident, person treated on scene.	3	Remote	Unlikely to occur	3
Minor	Nuisance. Use of emergency procedures. Minor incident	2	Improbable	Very unlikely to occur	2
Negligible	Little consequence	1	Extremely Remote	Almost inconceivable that the event will occur	1

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sUAS Contact Information		
Role/Organization	Name	Phone
<b>Executive</b>		
<b>Manager</b>		
<b>RPIC</b>		
<b>RPIC</b>		
<b>RPIC</b>		
<b>RPIC</b>		
<b>VO</b>		
<b>VO</b>		
<b>VO</b>		
<b>Public Affairs</b>		
<b>Airport Manager</b>		
<b>Weather</b>	Flight Service	1-800-992-7433
<b>NOTAMS</b>	Flight Service	1-800-992-7433
<b>Dispatch</b>		
<b>Hospital</b>		
<b>FAA Regional Office</b>		
<b>FAA FSDO</b>		

# Mission Brief

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sUAS Mission Brief		
<b>General</b>	Intro and big picture*	
<b>Weather</b>	Review forecast*	
	Discuss inclement weather plan	
<b>Mission description</b>	Review goals*	
	Provide general description of mission*	
	Crew assignments and duties	
	Takeoff and landing methods (auto or manual)*	
	Sensor use and settings*	
	Flight duration*	
	Flight area boundaries and obstructions	
	Update sUAS status*	
	Confirm necessary documents on site	
<b>Safety</b>	Location of fire extinguisher	
	Airspace intruder plan	
	Maintain sterile cockpit	
	Personnel injury and care	
	ID nearest hospital	
	ID flight line/do not cross areas/danger zones	
	No overflight of personnel	
	Non-participants remain clear	
Crewmembers are fit for duty		
<b>Hazards</b>	Review Risk Assessment Form (as applicable)	
<b>Emergencies</b>	Immediate landing scenarios	
	Fly-away	
	Lost link	
	ID Flight Termination Point (as applicable)	
	Loss of Control	
	Others	
<b>Communications</b>	Contact ATC	
	Confirm NOTAM submitted (if applicable)	
	Monitor ATC frequencies (if applicable)	
	Contact Manager at start and finish of flight operations	

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sUAS Preflight Checklist (Supplemental)			
	Item	Action	Status
1	Safety Brief	Complete	
2	Takeoff/landing area	Delineate and clear of debris	
3	Airworthiness check	Visually inspect aircraft	
4	Airworthiness check	Visually inspect control surfaces and linkages	
5	Airworthiness check	Visually inspect propulsion system	
6	Avionics	Inspect control link transceiver, comm/navigation equipment, and antennas	
7	Airworthiness check	Inspect props for balance, damage, connections, tighten nuts	
8	Airworthiness check	Check camera/gimbal security, wiring and free from obstructions	
9	Remote Control	Verify batteries	
10	Battery	Verify sUAS battery	
11	Monitor	Verify display panel working properly	
12	Compass	Calibrate compass, if necessary	
13	Navigation	Check navigation and telemetry connection	
14	Airworthiness check	Confirm weight and balance is within manufacturer's recommendation	
15	Registration	Registration markings, for proper display and legibility;	
16	Non-participants	Remove from takeoff area	
17	Camera	Check camera operation	
18	Failsafe/RTH	Enter program safe parameters	
19	Ground support equipment	Check proper operation and location	
20	Data Storage	Confirm data storage installed and functional	
21	Phone calls	Contact ATC and Manager as necessary	
22	All clear check	Check takeoff area, airspace, flight area	

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# Mission Report



sUAS Mission Report									
Mission Date	sUAS Model	Mission Name							
Location									
Weather									
Component Info		sUAS Flight Time							
Item	Minutes	Number of Flights	Takeoff	Land	Fit Time (0.0)				
Battery #									
Battery #									
Battery #									
Battery #									
Data Storage Device #									
Data Storage Device #									
Remarks									
Crewmember Flight Time									
Last Name		Crew Position	Total Time (0+00)	Takeoffs	Landings				
Mission Type (check all that apply)									
Mission	<input type="checkbox"/>	Training	<input type="checkbox"/>	Maintenance	<input type="checkbox"/>	Evaluation	<input type="checkbox"/>	Other	<input type="checkbox"/>
List any Malfunctions (if applicable)									
RPIC Signature*					Date				

\*Typed name constitutes signature

# Authorized Missions

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# Property Access Form

## Appendix 9

sUAS Property Access Form	
Date:	
Location/Address:	
<p>“RPIC” and Location Owner or Authorized (“Owner”) agree as follows:            Owner agrees that RPIC and persons designated by RPIC may be in, on, or about the above location on the date(s) indicated above, for the purposes of supporting an organizational mission. RPIC shall hold Owner harmless from and indemnify Owner against any damage to the above location caused by any persons designated by RPIC to be on the location or against any injuries occurring to persons designated by RPIC to be on the location.</p> <p>Owner represents and warrants that Owner has the right to enter into this agreement and that the rights Owner has granted hereunder will not conflict with or violate any commitment, agreement, or understanding Owner has or will have to or with, nor infringe upon any rights of, any person or entity. Owner expressly releases RPIC and RPIC’s employees, officers, agents, assignees, and licensees from all claims, losses, costs, expenses, settlements, demands and liabilities of every kind.</p> <p>Owner hereby waives any claims they may have in connection with the use of the materials by Operator including without limitation claims for rights of privacy, publicity, defamation, infringement of copyright and trademark infringement. Further, Owner hereby waives any rights to equitable relief in connection with the use of the materials by Operator, his successors, licensees, designees or assigns.</p>	
RPIC Name:	
RPIC Signature:	
Date:	
Owner Name:	
Owner Signature:	
Date:	
Phone:	

# 14 CFR Part 107 Summary

## Appendix 10

14 CFR Part 107 Summary	
<b>Aircraft Requirements</b>	Any small UAS greater than 0.55 lbs. must be registered with the FAA prior to
	Aircraft markings are required.
	FAA airworthiness certification not required. However, the RPIC must maintain sUAS in a condition for safe operation and prior to flight must inspect the UAS to ensure that it is in a condition for safe operation.
	14 CFR part 107 does not apply to model aircraft that satisfy all of the criteria specified in Public Law 112–95 section 336.
<b>RPIC Certification and Responsibilities</b>	Remote PICs are required to: <ul style="list-style-type: none"> <li>• Be at least 16 years old</li> <li>• Be able to read, speak, write, and understand the English language (FAA may make exceptions for medical reasons)</li> <li>• Be in a physical and mental condition that would not interfere with the safe operation of a sUAS</li> <li>• Pass an initial aeronautical knowledge test at an FAA-approved knowledge testing center (or pass this online course, for part 61 certificate holders)</li> <li>• Obtain an unmanned aircraft operator certificate with a small UAS rating (like existing pilot airman certificates, never expires)</li> <li>• Pass a recurrent aeronautical knowledge test every 24 months</li> </ul>
	Prior to flight, the Remote PIC must: <ul style="list-style-type: none"> <li>• Conduct a preflight inspection, to include specific aircraft and control station systems checks, to ensure the sUAS is safe for operation</li> <li>• Make available to the FAA, upon request, the sUAS for inspection or testing, and any associated documents/records</li> </ul>
	A person operating a small UAS must either hold a remote pilot airman certificate with a small UAS rating or be under the direct supervision of a person who does hold a remote pilot certificate (remote pilot in command).
	Report an accident to the FAA within 10 days if the small UAS operation results in

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<b>Operational Requirements</b>	Unmanned aircraft must weigh less than 55 lbs. (25 kg).
	Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the operator and visual observer (if one is used). At all times the small unmanned aircraft must remain close enough to the operator for the operator to be capable of seeing the aircraft with vision unaided by any device other
	At all times the small unmanned aircraft must remain close enough to the remote pilot in command and the person manipulating the flight controls of the small UAS for those people to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses.
	No person may act as a remote pilot in command or VO for more than one unmanned aircraft operation at one time.
	No carriage of hazardous materials.
	A person may not operate a small unmanned aircraft if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS.
	External load operations are allowed if the object being carried by the unmanned aircraft is securely attached and does not adversely affect the flight characteristics or controllability of the aircraft.
	The Remote PIC may use visual observers (VOs), but they are not required.
	Transportation of property for compensation or hire allowed provided that- <ul style="list-style-type: none"> <li>• The aircraft, including its attached systems, payload and cargo weigh less than 55 pounds total;</li> <li>• The flight is conducted within visual line of sight and not from a moving vehicle or aircraft; and</li> <li>• The flight occurs wholly within the bounds of a State and does not involve transport between (1) Hawaii and another place in Hawaii through airspace outside Hawaii; (2) the District of Columbia and another place in the District of Columbia; or (3) a territory or possession of the United States and another place in the same territory or possession.</li> </ul>
	No person may act as the Remote PIC, a person manipulating the controls, or a
	Daylight-only operations (official sunrise to official sunset, local time). Twilight operations are approved when the small UAS is equipped with lighted anti-collision lights.
	Must yield right-of-way to other aircraft, manned or unmanned.
	First-person view camera cannot satisfy “see-and-avoid” requirement but can be
	Small unmanned aircraft may not operate over any persons not directly involved in the operation, not under a covered structure, and not inside a covered stationary vehicle.
	No operations from a moving aircraft.
	No operations from a moving land or water-borne vehicle, except when flown over a sparsely populated area and not carrying another person’s property for compensation or hire.
	Maximum airspeed of 100 mph (87 knots).
	Maximum altitude of 400 feet above ground level unless flown within a 400- foot radius of a structure and does not fly higher than 400 feet above the
	Minimum weather visibility of 3 miles from control station.
	Operations in Class B, C, D and E airspace are allowed with the required ATC permission.
Operations in Class G airspace are allowed without ATC permission	
A remote pilot in command may deviate from the requirements of this rule in response to an in-flight emergency.	
No careless or reckless operations	



# sUAS Data, Privacy and Good Neighbor Policy

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## sUAS Data Policy

The sUAS program participants shall adhere to the following guidance during sUAS operations that can, or have the potential to, capture, store, transmit, and/or share data, including audio, video, visual images, or other personally identifiable information which may include the time, date, and geographic location where the data were captured.

**Digital Media Evidence (DME)** — DME shall be handled in accordance with existing policy on data and record retention, where applicable.

**Disposition of Non-DME** — All digitally recorded imagery (video, or still photography), or other data not required as evidence or for use in an on-going investigation shall be managed in accordance with policy. This includes: compliance with state and local records retention schedules; that organization personnel may not edit, alter, erase, duplicate, copy, share or otherwise distribute the data, and instances where the data is made available for public inspection.

**Personally Identifiable Information (PII)** — Any non-DME imagery that contains PII shall not be retained for more than 180 days, or per state or local record retention schedules.

**Data Minimization and Limitation** — Only those technologies and only those data that are strictly needed to accomplish the specific objectives approved by the organization will be deployed, and only for so long as it demonstrates continuing value and alignment with applicable constitutional, legislative, regulatory, judicial, and policy mandates.

**Security** — organization will ensure appropriate security of the technology (including networks and infrastructure) and the data it provides to safeguard against risks of loss, unauthorized access or use, destruction, modification, or unintended or inappropriate disclosure.

**Auditing and Accountability** — employees, subcontractors, and volunteers shall be held accountable for complying with agency, state, and federal policies surrounding the deployment and use of the technology and the data it provides. All access to data derived and/or generated from the use of relevant technologies shall be subject to specific authorization and strictly and regularly audited to ensure policy compliance and data integrity.

**Public Domain** — expressed consent of the person(s) or property owner involved will be necessary when displaying videos or data publically in an outlet such as the organization website.

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**sUAS Good Neighbor Policy**

These voluntary guidelines provide a balance between your rights as a sUAS operator and other people’s rights to privacy. The overarching principle should be peaceful issue resolution.

If you can, tell other people before taking pictures or video.

If you think someone has a reasonable expectation of privacy, don’t violate that privacy by taking pictures, video, or otherwise gathering sensitive data, unless you’ve got a very good reason.

Don’t fly over other people’s private property without permission if you can easily avoid their property.

Don’t gather personal data for no reason, and don’t keep it for longer than necessary.

If you keep sensitive data about other people, secure it against loss or theft.

If someone asks you to delete personal data about him or her that you’ve gathered, do so, unless you’ve got a good reason not to.

If anyone raises privacy, security, or safety concerns with you, try and listen to what they have to say, as long as they’re polite and reasonable.

Don’t harass people with your sUAS.

**Use and Privacy Policy**

The City shall not use any City sUAS for purposes of law enforcement by police or neighborhood services, will rigorously respect the privacy of all persons, and will not use the sUAS in violation of any other City policy, including but not limited to prohibitions on discrimination and harassment.

City staff shall not use any City sUAS to interfere with any activities protected by the First Amendment.

City staff shall not use any City sUAS in violation of any Fourth Amendment protection against unreasonable searches and seizures in which a person has a reasonable expectation of privacy.

City staff shall not use any City sUAS to engage in any discrimination or any other act in violation of City policy, including but not limited to policies prohibiting discrimination or any harassment based on race, color, creed, religion, ancestry, sex, sexual orientation, national origin, affection preference, gender preference, genetic testing, disability, age, marital status or status with regard to public assistance or as a disabled veteran or veteran of the Vietnam era.

City staff shall only collect, use and dissemination information and data obtain from the use of City sUAS for authorized purposes which comply with this Use and Privacy Policy as well as all applicable court orders and local, state and federal laws.

# Incident Report

## Appendix 13

sUAS Incident Report		
	Item	Notes
1	Provide medical treatment/call 911 (if necessary)	
2	Secure area (if possible)	
3	Notify your organization and Manager	
4	Contact FAA within 10 days (As required)	
5	RPIC's name and contact information	
6	RPIC's FAA airman certificate number	
7	sUAS FAA registration number	
8	Location of the accident	
9	Date of the accident	
10	Time of the accident	
11	Person(s) injured and extent of injury, if any or known	
12	Property damaged and extent of damage, if any or known	
13	Description of what happened	
14	Weather conditions	
15	Describe damage to UAS	
16	Injured person name and contact information	
17	Owner of damaged property name and number	
18	Take photo's of damage	
19	Save all sUAS electronic information	
20	Describe sUAS mode	
21	Describe sUAS speed, altitude, heading	
22	Witness name and contact information	



# Maintenance Schedule

## Appendix 15

sUAS Maintenance Schedule*	
<b>Before and After every flight</b>	
Check condition of props	
Check motor shafts have no free play	
Check motors move freely when spun by hand	
Check condition of battery, battery connectors and data pins	
Check camera/payload mounts are secure	
Check antennas are securely fastened	
When powered up and idling confirm no unusual noise or vibration from motors.	
<b>Every 10 flights</b>	
Visual inspection of shell and other plastic components for cracking/damage	
Check tightness of motor retaining screws and shell retaining screws	
Check batteries for number of cycles and discharge per manufacturer recommendations if required.	
<b>Every 40 flights</b>	
Remove upper shell and check state of all wiring, plugs fully seated, condition of all solder joints, condition of visible circuit boards and wiring runs, internals generally clean and no debris/loose items. (verify warranty)	
<b>Every 100 hours</b>	
Remove and replace camera rubber shock/vibration mounts on gimbal	
Remove and replace motors	
Remove and replace propellers	
*Suggested schedule if no schedule is provided by the manufacturer	