

Unmanned Aerial Vehicle Program

STANDARD OPERATIONAL GUIDELINES

DATE: February 2021

Purpose:

To establish operating guidelines for the use of unmanned aerial vehicles (UAV) in support of both non-emergent and emergency services provided by the City of Plymouth (City). The primary goal is to provide a framework for the safe operation of a UAV while adhering to applicable rules and regulations guiding UAV use.

Scope:

This guideline will apply to all City of Plymouth personnel serving as remote Pilot in Command (PIC), person manipulating the controls, and Visual Observers (VO) who are trained and authorized by the City of Plymouth to operate a City owned UAV in support of both non-emergent and emergency services provided by the City of Plymouth. This guideline covers all authorized mission categories:

- 1) Public Safety,
- 2) 2)Inspections, 3)
- 3) Communications/Media, 4)
- 4) Emergency Management Assessment.

Unmanned Aerial Vehicle (UAV) - An unmanned aerial vehicle is an unmanned aircraft of any type that is capable of sustaining flight, whether remotely controlled or preprogrammed and all of the supporting or attached hardware designed for gathering information through photography, video recording or any other means. UAV's are also commonly referred to as unmanned aerial systems (UAS) or drones.

Guideline

UAV Coordinator:

- A. The City Manager will appoint a UAV Program Coordinator to be responsible for the oversight and operational use of all UAV's owned and operated by the City of Plymouth. The UAV Coordinator will be responsible for the safety of all operations conducted by the City of Plymouth.
- B. The UAV Program Coordinator will be responsible for the supervision of City Remote PIC, Manipulator of the Controls, and VO; and will ensure compliance with applicable 14 Code of Federal Regulation (CFR) Part 107 rules and regulations, all provisions of any 14 CFR Part 107 Waivers obtained by the City, or any Certificate of Waiver/ Authorization (COA) issued to the City of Plymouth by the Federal Aviation Administration (FAA).

- C. The UAV Program Coordinator will maintain records of all certifications, waivers, and endorsements along with UAV operational flight records for authorized UAV personnel and equipment.
 - D. The UAV Program Coordinator or their designee, will be responsible to ensure the City of Plymouth UAV's are in an operational status at all times.
- I. Remote Pilot in Command
- A. Federal Aviation Administration (FAA) Advisory Circular 107-2 (June 21, 2016) defines remote Pilot in Command (remote PIC or Remote Pilot) as a person who holds a remote pilot certificate with an UAV rating and has the final authority and responsibility for the operation and safety of an UAV operation conducted under part 107.
 - B. Department personnel acting as remote PIC of an UAV must obtain a Part 107 Remote Pilot certificate with a UAV rating issued by the FAA. Department Remote Pilots must have an active certificate easily accessible during flight operations.
 - C. Remote Pilots will operate UAV aircraft at all times with the safety of the public as the primary goal, while making all efforts to accomplish the specific mission at hand.
 - D. The remote PIC will ensure they are positioned in a location where they are able to see the UAV continuously and sufficiently to maintain visual line of sight (VLOS).
 - E. In addition, any personnel acting as remote PIC must obtain training in UAV Night Operations through a program approved by the UAV Program Coordinator.
 - 1. Remote PIC will be trained to recognize and overcome visual illusions (autokinesis, false depth perception, flicker vertigo, reversible perspective, and size and distance illusion) caused by darkness, and understand physiological conditions which may degrade night vision.
 - 2. Remote PIC must have a current endorsement easily accessible during flight operations.
 - H. City remote PIC must participate in at least one training flight per month as the remote PIC (manipulating the controls). A training flight must be documented every month. A memo will be sent to the UAV Program Coordinator if over 30 days. A documented training flight must be completed no more than 30 days prior to any official use of the UAV. All flight data and documentation will be transferred to the appropriate software for historical and reportable data.
 - 1. Public Safety personnel must complete at least one additional low light training flight per month.

II. Person Manipulating the Controls:

- A. FAA Advisory Circular 107-2 (June 21, 2016) defines a person manipulating the controls as a person other than the remote PIC who is controlling the flight of an UAV under the supervision of the remote PIC, or is the remote PIC themselves if controlling the UAV.

- B. City of Plymouth personnel who do not hold a FAA remote pilot certification may operate the flight controls of City of Plymouth UAV's only during training flight missions and only under the direct supervision of a City of Plymouth remote PIC in compliance with 14 CFR Part 107 rules and regulations, or COA authorization by the FAA.

III. Visual Observer:

- A. FAA Advisory Circular 107-2 (June 21, 2016) defines Visual Observer (VO) as a person acting as a flight crew member who assists the UAV remote PIC and the person manipulating the controls to see and avoid other air traffic, or objects aloft or on the ground.
- B. The role of VO is to alert the rest of the flight crew about potential hazards during UAV operations.
- C. The City remote PIC will ensure that all VO:
 - 1. Are positioned in a location where they are able to see the UAV continuously and sufficiently to maintain VLOS.
 - 2. Must possess a means to effectively communicate (either face to face or via radio) the UAV position and the position of other aircraft to the remote PIC and person manipulating the controls.
- D. Department personnel acting as VO will be trained in-house by a City of Plymouth remote PIC utilizing the current ASA Remote Pilot Test Prep book. Training will cover the following topics:
 - 1. Chapter 1 – Regulations: Specifically, remote pilot certification and privileges, supporting crew roles, accident reporting, preflight action and inspection, daylight operations, visual line of sight, right of way rules, no operation over people, privacy and other considerations, and alcohol and drugs.
 - 2. Chapter 2-National Airspace System. Specifically, airport operations, collision avoidance, and in-flight hazards.
 - 3. Chapter 5 – Operations. Specifically, communication procedures, emergency procedures (lost link, flight termination, flyaways, loss of GPS, and battery fires), aeronautical decision making, and physiology.
 - 4. In addition, personnel acting as VO will be trained to recognize and overcome visual illusions (autokinesis, false depth perception, flicker vertigo, reversible perspective, and size and distance illusion) caused by darkness, and understand physiological conditions which may degrade night vision.

IV. General Operational Requirements:

- A. All UAV operations will be conducted in compliance with current FAA guidelines, which are made a part of this guideline.
- B. City remote PIC must be knowledgeable in the return to home and lost communication failsafe features of all UAV's owned and operated by the City.

- C. When arriving at the scene of a mission, the remote PIC will position their vehicle in such a location to permit for the safe launch and recovery of the UAV. The launch and recovery location of the UAV will be determined by the remote PIC.
 - D. If members of the public are nearby, the remote PIC and VO, in conjunction with Incident Commander (IC) or their designee will establish a restricted access area for UAV operations. This will be at least a 20-foot radius around the proposed takeoff and recovery point.
 - E. The remote PIC will ensure that the person manipulating the controls (PIC) and VO (if applicable) are positioned in a location where they are able to see the UAV continuously and sufficiently to maintain VLOS. In addition, the UAV will be operated with factory lights on at all times to assist in maintaining VLOS.
 - F. Prior to any flight the remote PIC and VO will survey the immediate area to identify and mark flight obstructions and hazards.
 - G. The UAV will be required to be held in an operational status at all times practical. This will require regular review of hardware and software and inspection of all components to maintain operational use and mission readiness by the UAV Program Coordinator or their designee.
 - I. The remote PIC will be responsible for the delivery of the UAV and operation at a designated scene.
 - J. All required flight data and documentation will be transferred to the appropriate software for historical and reportable data.
 - K. Additional considerations: Current weather conditions, including wind, rain/snow, and temperature should be considered prior to flight. It is acknowledged that colder temperatures hinder battery health and increases the risk of equipment failure. Inclement weather increases the chance of equipment damage and under extreme situations should a flight occur.
- V. Operational Requirements Related to Public Safety Missions: In addition to the above listed general requirements, the following requirements must be met during public safety related missions. Public Safety missions will follow, Policy 606 and Minnesota Statute 626.19 and amendments to Minnesota Statute 13.82
- A. When conducting public safety related flight missions, Remote Pilots will operate under their designated call sign (67XX).
 - B. The remote PIC will operate under the direction of the Incident Command (IC) if an incident command structure has been established, but the remote PIC maintains the sole and exclusive responsibility of operating the UAV in a manner acceptable to the remote PIC. This might mean the refusal to fly if the situation is determined to be unsafe at the sole discretion of the remote PIC.
 - C. During Public Safety related missions, the remote PIC will be required to be in radio contact with the IC at all times while on scene. The remote PIC and VO must be able to communicate either face to face or via radio throughout flight operations.
 - 2. All UAV's owned by the City of Plymouth must be equipped with operations lights to allow for the identification of the aircraft while in the air and will be operated with factory lights on at all times to assist in maintaining VLOS.

3. The City of Plymouth will make every effort to maintain VLOS of its UAV at all times. However, in the unlikely event the remote PIC and/or VO should lose sight of the aircraft the 'Go Home Button' (return to home failsafe) will be activated. Once the PIC and VO have both regained VLOS, the remote PIC will take over control and continue to return the UAV to the takeoff location and land. Once the VLOS issue(s) have been addressed, the remote PIC will determine if additional missions can be flown safely and in compliance with applicable Part 107 rules and regulations, and with all provisions of any Part 107 Waivers or Certificate of Authorizations (COA) obtained by the City of Plymouth.
4. Prior to any lowlight /night time flight the remote PIC and VO will survey the immediate area to identify and mark flight obstructions and hazards.
 - a. Emergency public safety missions during low light and night time periods may be flown over sparsely populated rural areas or over neighborhoods.
 - b. During emergency public safety missions, preflight scene scouting of the immediate area will be done to identify and mark flight obstructions and hazards.
 - c. In sparsely populated rural areas, the remote PIC and VO will monitor the flight path of the UAV and avoid operating over persons not involved with the incident.
 - d. In more populated areas the remote PIC, VO, IC and ISO will block off the immediate area around the emergency scene to create a restricted access area.
 - e. Flight operations will be confined to the restricted area immediately above the emergency scene.
 - f. The remote PIC and VO will monitor the flight path of the UAV and avoid operating over persons not involved in the incident.
5. The remote PIC and VO will monitor for other aircraft operating in the area by identifying their required lighting. The VO will be able to verbally communicate with the remote PIC (either face to face or via radio) to provide immediate warning of other airspace users that require avoidance action by the remote PIC. If there is an airspace incursion, the flight will terminate immediately with the PIC taking action to avoid collisions and land safely.

VI. Approved UAV Mission Categories for the City of Plymouth:

- A. Public Safety
- B. Surveys and Inspections
- C. City Communications Publications
- D. Emergency Management – Damage Assessments
- E. City project documentation
- F. Community Relations