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NEW YORK NAVAL MILITIA INSTRUCTION 5401.4

From: Commander, New York Naval Militia

Subj: UNMANNED AERIAL SYSTEM (UAS) PROGRAM GUIDANCE

Ref:　(a) TAG-NY Memorandum for the Record, 27 Aug 2024
　　　 (b) NYS Office of Parks, Recreation and Historical
　　　 Preservation OPR-PCD-018
　　　 (c) FAA Part 107

Encl:　(1) Definitions and Responsibilities
　　　 (2) Standard Operating Procedures
　　　 (3) DMNA Pamphlet 1-2 Incident Reporting
　　　 (4) Serious Incident Report (SIR) Format

1. Purpose. To promulgate the New York Naval Militia (NYNM) Unmanned Aerial System (UAS) program.

2. Background. Since Hurricane IRENE in 2011, there have been numerous instances when having a readily available aerial reconnaissance capability would have improved New York military forces response. This instruction complies with policies developed by the New York State UAS Working Group, the State of New York Division of Homeland Security and Emergency Services (DHSES), and Department of Environmental Conservation (DEC).

3. Discussion. The general purpose of having the UAS program within the New York Naval Militia is to provide aerial maritime domain awareness, and support to New York National Guard civil support operations. A few examples may include flood and snowstorm response; support to Civil Support Teams; distressed boater awareness; ice floe accumulation analysis; and critical infrastructure inspection.

4. Action. In accordance with references (a), (b) and (c), New York Naval Militia personnel associated with this program shall thoroughly familiarize themselves and comply with enclosures (1) and (2) of this instruction. Training and qualification for Remote Pilot in Command (RPIC) are found in the separate Personal Qualification Standards instruction.

5. Training. The key to continued safe operations is by maintaining a professional level of competency. The first step in this process is establishing minimum qualifications for selecting operators, and the second step involves training those personnel.

　a. TRAINING PLANS

(1) All operators have a training plan on file that outlines training objectives. This training plan will be held in conjunction with the member's normal training file.

(2) The approved training plan is developed by the UAS coordinator. The UAS coordinator role will typically be filled by the UAS Senior Enlisted Leader (SEL) or other designated Officer or Senior Enlisted Service Member.

(3) All deployments or exercises are documented and count toward an operators training.

(4) It is the UAS Coordinators/RPIC responsibility to verify the training file contains all pertinent information.

 b. INITIAL TRAINING

(1) Operators must obtain FAA Remote Pilot Certification. In addition, the operator should, at a minimum, have knowledge of the rules and responsibilities described in 14 CFR 91.111, Operating Near Other Aircraft; 14 CFR 91.113, Right-of-Way Rules: Except Water Operations; and 14 CFR 91.155, Basic VFR Weather Minimums; knowledge of air traffic and radio communications, including the use of approved ATC/pilot phraseology; and knowledge of appropriate sections of the Aeronautical Information Manual.

(2) In conjunction with fulfilling all training requirements for RPICs duties, the new operator must also become familiar with UAS operations, the aircraft and its equipment.

(3) Any new operator who fails to successfully complete the initial training may be denied as a RPIC of the UAS operation.

(4) Before an operator can fly as RPIC, he/she must complete at least two hours of flight training with the department assigned UAS Coordinator to show proficiency of the flight training exercises and the airframe. This must be accomplished to show their ability and knowledge of the UAS.

 c. RECURRENT TRAINING

 (1) All operators shall maintain proficiency in their RPIC abilities. Operators shall conduct proficiency training of five days per year to maintain RPIC status.

 (2) Recurrent training is not limited to actual operating skills but includes knowledge of all pertinent UAS/aviation matters.

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DEFINITIONS AND RESPONSIBILITIES

The following definitions apply throughout this instruction.

1. <u>UAS Coordinator</u> means the individual responsible for all UAS program functions including administration, reviews and authorizations of UAS operations, assignments and tracking of equipment, overseeing needed UAS repairs, conducting audits and quality control reviews, and organizing training, proficiency reviews, and flight records for crew members.

2. <u>Certificate of Waiver or Authorization (COA)</u> means an authorization issued by the Federal Aviation Administration (FAA) to a public operator for a specific UAS. After a complete application is submitted, the FAA conducts a comprehensive operational and technical review. If necessary, provisions or limitations may be imposed as part of the approval to ensure the UAS can operate safely with other airspace users.

3. <u>Crew Members:</u> These individuals perform duties that are essential to the operation of the UAS. The two different types of crew members are the Visual Observer (VO), and the External Pilot (EP).

4. <u>Currency Flight</u> means a flight conducted by an RPIC, which demonstrates safe and proficient operation of the UAS, and satisfies the currency requirement.

5. <u>Certified UAS Operator</u> means a member authorized by NYNM to operate an unmanned aircraft as Remote Pilot in Command, has completed an agency-approved training program, and meets all conditions of the COA and/or Part 107.

6. <u>Designated Training Area</u> means a pre-determined location used for flight training and functional testing, authorized by the UAS Coordinator.

7. <u>Emergency</u> means a sudden or unexpected event which causes or threatens imminent harm or injury to a person, or there is the possibility of loss of life, endangerments to the public at large, endangerment to military or civilian property, the environment and/or the State's natural resources, and/or which requires an immediate response and/or remedial action. Emergency also includes the collection of any data that is time sensitive. This relates to the emergency both during and after the event.

8. <u>Flight</u> means the take-off, in-flight, and landing part of the mission.

9. <u>Flight Training</u> means any flight performed for the specific purpose of developing pilot skills and knowledge for future missions, learning and understanding the UAS components and its limitations, and/or learning and understanding pilot limitations for a particular environment or condition.

10. <u>Lead Remote Pilot in Command (LRPIC)</u> means a remote pilot in command (RPIC) is identified prior to the start of a mission, to coordinate the mission when multiple RPICs are participating. The LRPIC is responsible for ensuring that the participating parties comply with all applicable requirements during the mission.

11. <u>Low Altitude Authorization and Notification Capability (LAANC)</u> means the FAA system, which provides airspace authorization to fly within controlled airspace, at specific altitudes, not permitted under normal Part 107 rules.

12. <u>Mission</u> means the entire operation from initiation to completion and includes planning and coordination, site assessment, pre-flight, flight, and post-flight. The mission can occur on one day and include one or be multiple flights and span multiple days.

13. <u>Non-Emergency</u> means missions that are not defined as emergency and include, but are not limited to, flight training, aerial mapping, and environmental monitoring.

14. <u>NOTAM</u>: A Notice to Airmen is a notice containing information essential to personnel concerned with flight operations but not known far enough in advance to be publicized by other means. It states the abnormal status of a component of the National Airspace System (NAS) – not the normal status.

15. <u>Remote Pilot in Command (RPIC)</u> means a person who has the final authority and responsibility for the operation and safety of a flight; has been designated as RPIC before or during the flight; and holds the appropriate certificate, rating, and/or endorsement, if appropriate, for the conduct of the flight.

16. <u>RPIC/Unit Trainers:</u> (UT) These individuals evaluate, train, and provide technical supervision for the UAS standardization program.

17. <u>Small Unmanned Aircraft Systems (sUAS)</u> means an unmanned aircraft weighing less than 55 pounds, including everything that is onboard or otherwise attached to the aircraft, and can be flown without the possibility of direct human contact on or within the aircraft.

18. <u>Special Government Interest Process (SGI)</u> means the authorization process for emergency deployment of UAS for firefighting, search and rescue, law enforcement, utility or other critical infrastructure restoration, damage assessments supporting disaster recovery, and media coverage providing crucial information to the public.

19. <u>Sterile Cockpit</u> means no crew member may perform any duties during a critical phase of flight not required for the safe operation of the aircraft.

20. <u>UAS Discrepancy</u> means any event or occurrence that causes a deviation from normal operation or performance of the UAS or associated flight component, including any accident, incident or mishap, and/or software, hardware or firmware malfunction.

21. <u>Unmanned Aerial Vehicle (UAV)</u> means the device, that portion of the UAS, often called a "drone" that actually flies.

22. <u>Unmanned Aircraft Systems (UAS)</u> means an unmanned aircraft and its associated elements (Including communication links and the components that control the

unmanned aircraft) that are required for the safe and efficient operation of the unmanned aircraft in the National Airspace System.

23. <u>Visual Observer (VO)</u> means a person who is designated by the RPIC to assist the RPIC and the person manipulating the flight controls of the small UAS to see and avoid other traffic or objects aloft or on the ground.

STANDARD OPERATING PROCEDURES

1. The standard operational procedures will serve as a guide for flight operations planning and execution. The operational procedures document best practices and internal processes for safe and effective flight operations. This includes roles and responsibilities, mission phases, and emergency procedures. Flight operations should be conducted under the 14 CFR Part 107/Certificate of Airworthiness. The UAS Coordinator or Remote Pilot-in-command (RPIC) is responsible for the overall safety during UAS operations.

2. UAS COORDINATOR:

 a. The UAS Coordinator shall maintain a file for each operator and airframe. The file shall include copies of training records, flight incidents, maintenance records, etc.

 b. It is the responsibility of the UAS Coordinator to be current and to update the RPIC and observer with all federal and state regulations as they change.

 c. The UAS Coordinator shall ensure that the RPIC has all documents required as per FAA, state and department guidelines.

 d. The UAS Coordinator should ensure that the RPIC is current with the training and knowledge.

 e. It is the responsibility of the UAS Coordinator to ensure all UAS are registered and in airworthy condition.

3. REMOTE PILOT-IN-COMMAND (RPIC):

 a. To be considered for selection as an operator, applicants must meet the requirements for and successfully pass the FAA Remote Pilot Certification and New York Naval Militia RPIC PQS.

 b. Operators interacting with Air Traffic Control (ATC) shall have sufficient expertise to perform that task readily. Operators must have an understanding of and comply with FAA Regulations applicable to the airspace where the UAS operates.

 c. An operator's primary duty is the safe and effective operation of the UAS in accordance with the manufacturers' approved flight manual, FAA regulations, and New York State Statutes. Operators must remain knowledgeable of all FAA regulations; UAS manufacturer's flight manual, policy and procedures. Operators may be temporarily removed from flight status at any time by the UAS Coordinator, for reasons including performance, proficiency, physical condition, etc.

 d. It is the responsibility of the RPIC to ensure all UAS are registered and in airworthy condition prior to UAS operations.

4. OBSERVERS

a. Observers must have been provided with sufficient training to communicate clearly to the operator any turning instructions required to stay clear of conflicting traffic and obstacles.

b. An observer's primary duty is to be an observer for anything that may affect the RPICs primary duty while manipulating the controls before, during and after flight.

5. OPERATING RULES for the use of UAS in Class G airspace:

a. Must keep the aircraft in sight (visual line-of-sight).

b. Must fly under 400 feet.

c. Must fly during the day.

d. Must fly at or below 100 mph.

e. Must yield right of way to manned aircraft.

f. Must NOT fly over people.

g. Must NOT fly from a moving vehicle.

6. ADMINISTRATIVE REQUIREMENTS. RPICs and trainees shall maintain a logbook to include the following information for each training or operational flight session. The logbook shall be made available for inspection by the UAS Coordinator or chain of command.

a. Date/Time.

b. Equipment used.

c. Location (city or lat/long).

d. Flight conditions (weather, visibility, terrain, obstructions, etc.).

e. Position (PIC, VO, Trainee, instructor).

f. Mission Information (training, maritime support, CSO support, National Guard support, additional equipment used inflight, etc.).

g. Time aloft.

h. Number of take offs and landings.

i. Copies of certifications.

7. PRE-FLIGHT OPERATIONS. Preflight activities are the duty of the RPIC before the start of the flight operation. Activities include inspection of the aircraft, assessment of

the operating location, briefing crew members involved in the operation, and equipment checkouts. All flight operations should be conducted in accordance with the provision of 14 CFR Part 107, state and local regulations, and the operator's manual for the subject aircraft.

a. PLANNING

(1) The flight crew should be familiar with all available information pertaining to the flight such as take-off/landing, including but not limited to the operational limitations of Part 107, weather conditions, hazards, no fly zones, etc.

(2) Statutes require land-owner approval before operations take place in a non-emergency situation.

(3) RPIC will ensure the location for take-off and emergency landing is adequate upon arrival at the location. At least one emergency landing area should be identified before the start of operations.

(4) RPIC should be aware of all surroundings in the event that an emergency landing is necessary. This includes the ability to recover the UAS.

b. INSPECTION

(1) Before the first flight of the day, verify all batteries are fully charged.

(2) Check the airframe for signs of damage, and its overall condition.

(3) Check the entire aircraft per the pre-flight inspection instructions in the manual for the specific aircraft to make sure it is in good structural condition and no parts are damaged, loose, or missing.

(4) Check the propeller or rotor blades for chips, cracks, looseness and any deformation.

(5) Check that camera(s) and mounting systems are secure and operational.

(6) Perform an overall visual check of the aircraft prior to arming any power systems.

(7) Repair or replace any part found to be unsuitable to fly during the pre-flight procedures prior to takeoff.

c. WEATHER

(1) Before each flight the RPIC and observer should ensure that he/she gathers enough information about the existing and anticipated near-term weather conditions throughout the entire mission environment. As a best practice he/she should utilize FAA approved weather resources to obtain the best information. In order to obtain the latest and most current weather conditions, Notices to Airmen (NOTAMs), and Temporary Flight Restrictions (TFRs) the RPIC should obtain a local aviation briefing.

(2) Wind direction plays a major factor in flight operations. Operators should take precautions to ensure that wind conditions do not exceed the aircraft limits stated in the aircraft operations manual/specifications.

(3) The RPIC should ensure that the flight will occur within the weather requirements specified in Part 107.51 (c-d), 3 statute miles, the UA must be kept at least 500 ft. below a cloud and at least 2,000 ft. horizontally from a cloud. While the FAA can obtain waivers under Part 107 for certain types of operations in particular locations for night-time or beyond line-of-sight operations, the vast majority of authorizations are for FAA VFR conditions and require Visual Line of Sight (VLOS) between the aircraft and the UAS Operator as well as between the aircraft and the Visual Observer at all times.

 d. CHECKLIST. Preflight inspection is required under Part 107.49. A standard Flight Checklist shall be followed by the flight crew. The pre-flight checklist contains the following:

(1) Required documentation, Pilots Certificate, Aircraft Registration, UAS Flight Manual, Proof of Insurance.

(2) Weather conditions suitable.

(3) Check air frame for cracks and check all screws are tight.

(4) Propeller(s)/Rotor(s) not damaged and tightly fixed.

(5) Propulsion system mounting(s) secure.

(6) Batteries fully charged and securely mounted.

(7) Communications (datalink) check.

(8) Ensure the GPS module (if any) has GPS "fix."

(9) Check mission flight plan.

(10) "Return Home" and/or "Emergency Landing" locations (if supported by the particular UAS) are selected, located appropriately, and loaded to the GCS and aircraft.

(11) Ensure sensors are calibrated and that the right setting is loaded.

(12) Complete flight crew briefing.

(13) Ensure the launch site is free of obstacles.

(14) Recheck wind direction before launch.

(15) Confirm phone number for nearest Air Traffic Control facility in event of emergency.

(16) Pre-Flight and Post-Flight (safe on deck) reports MUST be made to the DMNA Joint Operations Center (JOC). The report must include: Flight location; RPIC (with contact number); estimated and (upon completion) actual duration of flight(s); any encounters with civilians; report if any images or videos were collected during the flight and where they are being stored, and, if necessary, any reportable instances during the flight(s).

8. DURING FLIGHT OPERATIONS

 a. The UAS RPIC should launch, operate, and recover from preset locations so that the aircraft will fly according to the mission plan.

 b. After the UAS is launched, the flight crew should have a clear view of the aircraft at all times, called Visual Line of Sight (VLOS). Observation locations should be selected for the maximum line of sight throughout the planned flight operations area (Part 107.31).

 c. The visual observer should be informed on what the aircraft is supposed to be doing and the altitude of the aircraft above ground level.

 d. Part 107.39 does not permit UAS flights over persons not directly involved in the operations. Flights taking place over populated areas, heavily trafficked roads, or an open-air assembly of people is not allowed under regulation (unless through waiver). If the mission dictates that flight operations be conducted in such areas, the RPIC will need to obtain a waiver before conducting a flight.

 e. The observer should make the pilot aware of any possible flight hazards during the flight.

 f. Upon any failure during the flight or any loss of visual contact with the UAS, the RPIC should command the aircraft back to the recovery location or utilize built-in fail-safe features to recover the aircraft. Emergency procedures as defined in the specific UAS operator's manual should be followed.

9. POST FLIGHT OPERATIONS

 a. RPIC should scan the landing area for potential obstruction hazards and recheck weather conditions.

 b. RPIC should announce to the observer and any other people around that the aircraft is on final approach and inbound to land.

 c. RPIC should always be prepared to reject or abort a take-off or landing, called a "go-around," if such an operation cannot be safety made due to an unexpected weather situation, emergency, hazard or miscalculation.

 d. Carefully land the aircraft away from any obstructions and people.

 e. After landing:

(1) Shut down the UAS and disconnect the batteries.

(2) Visually check aircraft for signs of damage and/or excessive wear.

(3) Verify that mission objectives have been met.

(4) If imagery or other data are recorded onboard the aircraft during flight, transfer the data as necessary to the Ground Control Station (GCS) or a backup storage device. If all data and imagery is transmitted to the GCS and recorded on the GCS during the flight, then operators may wish to consider backing up the data prior conducting additional flight operations.

(5) Enter logbook entries recording flight time and other flight details.

(6) In case there are multiple flights to be conducted, repeat checklist steps to prepare the aircraft for launch again.

(7) If any emergency event or serious incident occurs which causes or threatens imminent harm or injury to a person, or there is the possibility of loss of life, endangerments to the public at large, the environment and/or the State's natural resources, and/or which requires an immediate response and/or remedial action, the UAS OIC and the UAS SEL will be notified immediately. Notification of the UAS OIC/UAS SEL does not preclude required JOC notifications.

(8) Any emergency event or serious incident is a Commanders Critical Information Requirement. The UAS OIC or UAS SEL will immediately notify the Director of the NYNM and the Commander NYNM. Following notification, the UAS OIC or UAS SEL will complete a Serious Incident Report (SIR). The SIR format is located on the NYNM website.

10. FLIGHT AREA / PERIMETER MANAGEMENT. The selection of launch and landing sites is based first and foremost on safety. It is the job of the RPIC to ensure that all flight operations are within the FAA-issued airspace authorization parameters and UAS flight limits. Flight boundaries, including any restrictions imposed by FAA approvals, nearby airport locations, restricted areas, etc. should be reviewed prior to commencing flight operations. In addition, the RPIC should identify the following:

 a. Primary Take-off and Landing site - Typically the primary landing shall be the same as the launch site, but they can be separate locations. The RPIC has final authority for any approaches to the primary site and elect to reject an approach deemed unsafe.

 b. Alternate landing sites - The RPIC shall designate at least one alternate landing site. In the event that a landing is not possible, and the primary landing site is deemed unsafe, procedures to utilize the back-up site will be invoked.

 c. Mission Abort Sites - The RPIC may optionally designate an alternate landing site where the aircraft may be landed in an emergency situation. The alternate landing site should be located so as to provide absolute minimal risk if the aircraft is required to

vacate airspace in an emergency. If the RPIC deems it necessary, the UAS may be flown to this site and landed without regard to the risk to the flight equipment or the unmanned aircraft. The safety of persons, manned aircraft, and property should be prioritized over the risk to the UAS equipment.

 d. Flight over populated areas- The RPIC should make every effort to select a landing site that avoids approaches over populated areas.

 e. Landing Safety & Crowd control - All landing sites should be maintained and operated in the same manner as the launch sites. A buffer of at least 50 feet should be maintained at all times between aircraft operations and all nonessential personnel (all personnel other than the UAS Operator/RPIC and the Visual Observer).

11. FLIGHT CREW COMMUNICATIONS. It is important for the RPIC, Person Manipulating the Controls, Visual Observer(s), and other essential flight personnel to maintain communication at all times. During all operations observer and other flight personnel to acknowledge that he/she received a message. This way the flight crew can coordinate flight operations in an organized and effective manner. A proper decision-making structure (communications plan) should be identified prior to Pre-Flight Operations and should be followed by the flight crew at all times, i.e. (in-order of the hierarchy from highest to lowest) RPIC, Person Manipulating the Controls and the Visual Observer(s).

12. EMERGENCY PROCEDURES. Emergency procedures are specific to each UAS type as designed by the manufacturer. It is the responsibility of the flight crew to be proficient with the aircraft operational manual provided by the vendor before any flight operations are conducted. Prepare an Emergency Checklist (Figure 3) in case of emergencies. The RPIC should always be prepared to execute an emergency procedure in instances where there is a lost link, loss of GPS, or there are other aircraft or obstructions in the flight path. He/she should brief the flight crew before the start of the flight operations about emergency procedures and have a mission abort site for landing in the case of an emergency. After the aircraft has safely landed, it should be documented for maintenance purposes. Some possible emergencies due to system failures are as follows:

 a. Loss of Datalink communications

 b. Loss of GPS

 c. Autopilot Software error/failure

 d. Loss of Engine power

 e. Ground Control System failure

 f. Intrusion of another aircraft into the UAS mission airspace.

This is not meant to be a comprehensive list as the types of failures and associated emergency conditions vary for different UAS, airspace events, and crew performance.

Many UAS have a number of failsafe options in case of failures or emergency situations. These include using methods of stabilization and an automated Return to Land (RTL) or Loiter mode. Other features include fail-recovery software. The specific failsafe options available for each type of UAS should be outlined in the UAS documentation (Operator's Manual, Checklists, etc.). These fail-safe mechanisms should be tested during training and currency flights.

An emergency avoidance procedure should be determined before landing. Options include land immediately, move to a predetermined location and altitude, or another approach. All possible incursions must be assessed for risk mitigation.

In the event of a lost link or fly away, the RPIC should evaluate the airspace affected and contact the appropriate controlling agency immediately with details of the flight such as location, direction of flight and approximate altitude, speed and flight time remaining (remaining battery life).

Emergency Checklist		
Loss of Data link/ Ground Control System (GCS) Failure	**Autopilot software failure**	**Battery Warnings**
Result of both datalinks lost (no heartbeats) or GCS laptop and radio links fail for more than 10 seconds.	Result if the autopilot software crashes during flight mode	Result of main GCS laptop and radio links fail for more than 10 seconds.
→ UAV will loiter for 2 minutes (check operators manual for exact time) → If datalink not re-established within this time, flight will terminate and return to land (fail safe setting)	→ Try reconnecting from GCS laptop → RC control should be established and the UAV should be landed. If no RC then flight will terminate and return to land (fail safe setting)	→ If Battery low warning or battery percentage 35% then landing is advised. Use landing zone or alternate landing area. → If Battery percentage 10% for more than 5 seconds then lading or abort sequence is advised. → If 0% then engine shuts down.
Loss of GPS	**Loss of engine power**	**Intruding Aircraft**
Result when UAV loses GPS signal in the flight mode	Result of airspeed and altitude drop, engine most likely stopped working.	Result of another aircraft entering the UAS mission airspace (refer to FAR 91.113)
→ UAV will automatically loiter around point of GPS lock loss for 20 seconds (check operators manual for exact time) → UAV will navigate to Home waypoint → RC control should be established and the UAV should be landed. If no RC then flight will terminate and return to land (fail safe setting)	→ The UAV will attempt to glide to airfield home (fail safe) → Make sure the UAV is in line of sight at all times.	→ If approaching head-on both aircrafts alter their heading to the right. Same applies to UAVs too → Use FLY here option if available. → Immediately descend the UAV to safe altitude