Organizational Waiver for Kittyhawk.io - 107.29 (Night) Waiver

Please find our attached 107.29 (Night) waiver application. We appreciate your consideration.

Responsible Person:

Andrew Elefant, JD
Director of Policy at Kittyhawk.io
andrew@kittyhawk.io
(xxx) xxx-xxxx
UAV Certificate Number xxxxxxx (issued 5 January 2017)
Private Pilot Certificate Number xxxxxxx

The Responsible Person will be responsible to the FAA for conducting our operations safely. The Responsible Person will be responsible for organizing and maintaining documentation for our waiver, including training materials, flight crew rosters, and flight asset rosters.

The Responsible Person will maintain an accurate and up-to-date list (written or electronic) of those in our organization who are able to act as Remote Pilot in Command (RPIC) and/or Visual Observer (VO) for Night operations. This list will include the full name, Remote Pilot Certificate number, and certificate expiration date of each member of our organization who is current in their training and able to act as RPIC. No member of our organization will be allowed to be RPIC of a Night operation unless they hold a current Remote Pilot Certificate issued by the FAA (Part 107). This list will include the date of their initial training and the expiration date of their training. We will require recurrent training on an annual basis. This list will be available for inspection to the FAA upon request.

The Responsible Person will maintain an accurate and up-to-date list (written or electronic) of the aircraft available to be used in night-time operations. This list will include the manufacturer and model of the aircraft and its corresponding registration number. This list will be available to the FAA for inspection upon request.

The Responsible Person will make sure that prior to Night operations, the RPIC, VO(s), and anyone who will be manipulating the controls or participating in the operation is familiar with Part 107 regulations. The Responsible Person will also communicate to all parties in our organization what operations are allowed and not allowed under the terms of our waiver.

The Responsible Person will maintain a record of all documentation used for training purposes.

The Responsible Person's qualifications are as follows:

- Currently holds (and will maintain) a UAV certificate for Part 107 operations
- Has held the following FAA ratings: Private Pilot, Instrument, and Multi-Engine

- Has 400+ hours as PIC of various manned aircraft and 40+ hours as PIC on various UAVs

Location:

We will be operating solely in Class G airspace in the NAS under this waiver. All operations will be conducted in Class G airspace unless we receive a specific additional waiver or authorization allowing us to operate at night in controlled airspace. Many of our flights will take place in the San Francisco Bay Area, though some may take place elsewhere in the NAS.

Training:

We will require that prior to conducting Night operations the RPIC and VO(s) will be trained to recognize and overcome visual illusions caused by darkness, and understand the physiological conditions which may degrade night vision.

Our training materials will come from a variety of FAA-disseminated sources. Primarily, our training will be adapted from Chapter 10 of the Airplane Flying Handbook and Chapter 13 of the Helicopter Flying Handbook, both titled “Night Operations”.

The links to these materials are here:
https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/airplane_handbook/media/12_afh_ch10.pdf

And here:
https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/helicopter_flying_handbook/media/hfh_ch13.pdf

Topics of our training program will include (at a minimum) the following:

- Autokinesis: Fixation on a stationary object may cause incorrect perception of motion.
- Fixation / Fascination: Pilots may tend to fixate on a single point, making them less aware of other traffic. Scanning and off-center viewing techniques will be discussed.
- Reversible Perspective Illusion: Difficulty determining if an object is moving towards you or away from you
- Size-distance illusion: Objects may incorrectly seem closer when brightly lit, and further away when dimly lit.
- Flicker vertigo: Viewing a flickering light can be distracting, annoying, and disorienting

As stated above, our training materials and records of training compliance will be documented by the Responsible Person.

In order to act as an RPIC or VO, at a minimum, a member of our organization must read the above chapters (in addition to any other materials we may add) and pass a 10 question exam

given by the Responsible Person. A score of 9/10 is the minimum passing score. Any missed questions will be reviewed with the Responsible Person until a 100% score is reached. The Responsible Person will keep a written or electronic record of all members of our organization who have passed this exam (see above).

Remote Pilot in Command (RPICs):

The RPIC is required to have a VO for Night operations. All Night operations will therefore have a minimum of two participants, though we will aim for teams of three whenever possible.

The RPIC will have a copy - digital or print - of our successful waiver application available during operations taking place at night.

The RPIC will be responsible for ensuring and confirming that no person participating in Night operations will have consumed alcohol or any other substance which could impair their ability to safely participate in the proposed Night operation in the preceding 12 hours.

Pre-flight (Information / Notification) and Planning

Prior to the Night operation, the RPIC will check for any TFRs for the proposed area of flight. Resources may include the Kittyhawk app, 1800wxbrief.com, or comparable services.

Prior to the Night operation, the RPIC will check for any UAS NOTAMs and other NOTAMs using 1800wxbrief.com to make us aware of any other UAS or manned operations in the area.

The RPIC is responsible for ensuring that the operational area is safe from obstructions which could interfere with our operation.

RPIC will be responsible for creating a mission plan. Our number one focus is safety. RPIC will brief all participants on the mission's objective, potential safety challenges, and how the operation will be safely conducted.

RPIC will be responsible for conducting a pre-flight inspection of the aircraft and its components prior to every Night flight to make sure the aircraft is airworthy and capable of safely conducting the proposed operation.

RPIC will ensure that the aircraft software settings are set to a maximum altitude at or below 400 feet so that he or she will have an added safeguard to stay at or below 400 feet as required.

Performance Standards

Monitoring

The RPIC will continuously monitor and be aware of the following aircraft information in real time:

1. Location (latitude and longitude)
2. Altitude (AGL)
3. Attitude (Pitch, Bank, orientation, etc.)
4. Direction of flight
5. Flight path

The RPIC will receive onboard telemetry data to maintain the exact position, altitude, attitude, and movement of the aircraft, so the RPIC will be able to determine the orientation of the aircraft in operation at all times. Telemetry data will be provided in real-time by the Kittyhawk app, the DJI Go 4 app, or other comparable services.

We will not rely solely on the telemetry data for location awareness. The RPIC or VO(s) will maintain visual line of sight with the aircraft at all times. All aircraft participating in Night operations will be equipped with multiple colored lights enabling the RPIC and VO(s) to determine visually in which direction the aircraft is flying, and immediately be able to tell whether the aircraft is flying towards or away from the VO and/or RPIC.

The VO(s) will visually observe the location, altitude, and flight path and report that information to the RPIC. The VO(s) sole responsibility will be to observe our aircraft and surrounding environment and to check for other aircraft and/or people in the operating area.

The person at the controls of the aircraft will solely focus on flying the operation and maintaining visual contact with the aircraft. Any other activities will be performed by a VO or an additional member of the crew involved with Night operations.

Location

Landing and Takeoff Area: In order to make our landing and takeoff area safe, we will illuminate the area, identify the borders with cones, flags, signs, or other similar safety markers. The landing and takeoff area will be free and clear of obstructions for at least a 20 foot radius. These practices will ensure that non-participating individuals are aware of our operation and will not inadvertently enter our takeoff, landing, or operations area. They will also ensure that the RPIC and VO can see the entire landing area.

The RPIC will ensure that there is lighting sufficient to illuminate the takeoff and landing zone.

The RPIC, VO, or other participating individual will, when practical, surveil the area during daylight hours to identify any potential conflicts or challenges. If unable to surveil the area during

the day prior to Night operations, the RPIC and VO(s) will surveil the takeoff/landing area and area of proposed operation in detail prior to flight for any obstructions which could impact our operations. This will include establishing minimum safe altitudes for the operation.

Communication between RPIC, VO, and other participants

All VOs will be positioned in a way such that they can notify the RPIC of any unanticipated aircraft or people by way of a raised voice. If any VO is positioned in a location in which it is unlikely there can be unimpeded auditory communication to the RPIC by way of a raised voice, or if any VO will not be visible to the RPIC, that VO will be equipped with a two-way radio so that instant communications between VO(s) and RPIC will always be possible.

Lost Visual, Lost Link, and Unexpected Intrusion

General Procedures

If the RPIC and/or VO lose visual sight of the aircraft or lose the link with the aircraft, the RPIC will terminate the operation. Upon termination of the operation, the RPIC will initiate the Return-to-Home protocol or land immediately. This determination will be made by the RPIC using his/her best judgment with safety of people remaining the top priority.

Prior to every flight, the RPIC will discuss with all participating individuals the proper RTH protocol in the event of losing visual contact of the aircraft, losing our link to the aircraft, or encountering unexpected people or aircraft during flight. The RPIC is responsible for determining and programming a minimum safe altitude and flight path for the RTH protocol that avoids obstacles and non-participating individuals on the ground.

Intrusion of Non-participating individuals and/or aircraft

We will have signage or cones indicating our operations area and landing zone. In the event that a non-participating individual enters the operations area, the RPIC will monitor their motion and activity and will avoid flying directly over the individual.

In the event that another aircraft enters the operations area, the RPIC will monitor the flight path and altitude of that aircraft to determine the risk involved in continuing the operation. If the aircraft remains at or above the minimum safe altitude, we should maintain adequate separation. The RPIC will determine whether it is safe to continue the flight based on this information. The higher the risk, the more safety procedures and considerations will be required.

Aircraft Details

We will primarily be using DJI Mavic Pro and Phantom 4 Pro (v2) quadcopters, though we may include UAS made by DJI and/or other manufacturers (e.g. Yuneec, Autel, etc.). We may use other UAS as they are added to our fleet.

We will maintain a current list of aircraft by registration number used in Night operations. We will be able to provide this list to the FAA upon request.
Our UAS will run on smart batteries - primarily DJI intelligent flight batteries.

Our UAS generally have a flight time of 16-30 minutes. During all Night operations, the RPIC will ensure that the battery warning system is set to alarm when there is 30% battery remaining. Upon reaching 30% remaining battery, RPIC will cease the Night operation and focus solely on safely returning the aircraft to the launch point either by piloting or by enacting the RTH protocol.

To ensure containment, all participating aircraft will have the ability to transmit telemetry data that is transmitted to the RPIC's monitor. This ensures the RPIC will be able to maintain knowledge of the aircraft's exact location, altitude, attitude, and flight direction at all times.
We will also use a Visual Observer (VO) to maintain constant visual awareness of the aircraft's location.

To meet Part 1 & Part 5 of the Performance Standards outlined under Part 107.29, all of our aircraft participating in night operations will be outfitted with at least one strobe light visible beyond 3 statute miles as required by the FAA, in order to see the aircraft in the dark. This is in addition to the standard red and green lights onboard most DJI aircraft. No aircraft can participate in Night operations if it does not have, at a minimum, one green light, one red light, and one strobe light visible for more than 3 miles. These lights will also allow better visibility of the aircraft by the RPIC and VOs on the ground. The intensity of the lighting may be reduced if, because of operating conditions, it would be in the interest of safety to do so.
An example of a lighting system comparable to one we may use can be found here:
https://shop.lumecube.com/collections/drone-products/products/mavic-pro-kit

We will not be dropping payloads from any of our aircraft under our 107.29 waiver.

Manufacturer specifications for the DJI Mavic Pro are located here:
https://www.dji.com/mavic/info

Manufacturer specifications for the DJI Phantom 4 Pro (v2) are located here:
https://www.dji.com/phantom-4-pro-v2/info#specs

Manufacturer specifications for the DJI Mavic Air are located here:
https://www.dji.com/mavic-air/info#specs

Manufacturer specifications for the DJI Spark are located here:
https://www.dji.com/spark/info#specs