

This is a representative sample of an approved waiver application for 14 CFR § 107.51(b)

Safety Justification

We request a waiver to FAR 107.51(b) for altitude of 700 feet above the ground in the vicinity of the Park for photographic documentation during reconstruction.

We will use two type of UAS aircraft.

1. ABC Drones- 30x30- inch size quadcopter 24 min battery
2. XYZ Plane- 60 inch wingspan airplane 30 min battery

I have obtained a remote pilot certificate and have logged and flown these particular UAS for 400 hours since 2016.

The city of Nowhere, USA has made a request for photographic evidence of the construction process while it is under renovation. I have a safety mitigation plan that will answer the FAA's Wavier Safety explanation guidelines and additional methods for safety consideration.

We have identified the risk in this operation as follows:

- Possible collision with obstacles (trees)
- Possible collision with aircraft
- Loss of control due to signal loss or batter depletion
- Overflight of persons not affiliated with the flight operation.
- Loss of visual line of sight with the sUA by the VO and or RPIC
- Inability of ATC notification to cease operation.

We will address these risks and present a plan to mitigate those risks using the FAA WSEG questions and then add more info that will present a clear safety plan.

WSEG question #1.

1. **Describe how the small unmanned aircraft (sUA) will be able to avoid non participating aircraft and structures when operating at altitudes other than those prescribed in Title 14, Code of Federal Regulations (14 CFR) § 107.51(b).**

- a. How will the Remote Pilot in Command (RPIC) and Visual Observer(s) (VO), if used, see and avoid other aircraft when flying over 400 feet above ground level (AGL)?

The RPIC (myself) will be able to avoid non-participating aircraft and structures when operating at 700 feet AGL, using a combination of several methods.

1. Geo fencing will be preset to avoid any trees, power lines and other structures in my flight area and limit the altitude to no higher than 650 AGL, allowing a 50 foot buffer for altitude and measuring errors. My lateral limit will be set to no higher than 300 feet lateral distance from the ground control station. As seen from the attached overhead view there are few obstacles to consider at this site.
2. A Visual observer will assist me with avoidance of both structures and any non-participating aircraft. These may include another sUA or manned aircraft, like a helicopter, balloon etc. Should an aircraft approach the flight area and it would be noticed first by the aural sound of the engine/rotor noise the RPIC would immediately lower the altitude to 50 feet agl. Upon sighting of another aircraft by the VO or RPIC action would be taken to either land or hover and wait for the area to be clear of any risk. The VO will use specific language to alert the RPIC of an encroaching aircraft or if he/she believes that the sUA is too close to a structure or obstacle.
We do a pre brief (see attachment) about the communication to be used so there is no confusion during the planned flight. The landing zone would be preplanned since we have a small working area it would most likely be the same as our takeoff zone.
3. Both of the sUA's used in this operation will have 3 multi-color strobe lights that will be used by the VO and RPIC to maintain visual line of sight (VLOS.)
These lights have been rated by the manufacture to be seen for at least 3 statute miles in the daylight.
4. The RPIC will use the control station tablet to monitor the sUA's altitude and location in proximity to the trees. These trees will be marked on the viewable page as an area to avoid.
5. For aircraft avoidance that is an imminent threat of collision. The RPIC will maintain altitude and make an assessment as to whether it is best to maintain 700 feet or make a quick descent. In no case should the sUA be descended when the non-participating aircraft is lower than the sUA. Just making a turn to avoid collision would be a good yielding method.

WSEG Question #2.

2. **Describe how the visual conspicuity of the sUA will be increased to be seen at a distance of at least 3 statute miles (mi).**
 - a. Will the sUA be visible for at least 3 mi in the location where the RPIC will operate?

- b. If yes, how will you accomplish this?
- c. If no, why do other aircraft not need to be able to see your sUA from at least 3 mi?

We will make each sUA more conspicuous by placing 3 different color strobe lights on each aircraft. These strobes have been rated to be seen by at least 3 statute miles from the manufacture during the day. We also place a neon green and orange paint markings on the sUA body for better recognition by other aircraft.

Since we have limited the lateral distance of the sUA to only 300 feet from the RPIC we do not expect to lose VLOS. The expectation of other aircraft is low since there are no airports within 5 nm from the park and there are no agricultural aerial applicators that would be conducting operations nearby. The real concern is helicopters or other small unmanned aircraft. The RPIC will always yield to other aircraft so as not to create a collision hazard. The VO will assist the RPIC in locating other aircraft, and if they see one, the VO will tell the RPIC where the other aircraft is, and which way it is going. The RPIC will make a determination if the other aircraft represents a collision hazard or well clear violation, and yield the right of way as said in 107.37.

WSEG Question #3.

3. Describe how the RPIC will be able to accurately determine the sUA altitude, attitude, and direction of flight.

- a. How will the RPIC know, while keeping eyes on the sUA, the current real-time (1) geographic location, (2) altitude AGL, (3) attitude (orientation, deck angle, pitch, bank), and (4) direction of flight of the sUA?
- b. How will the RPIC maintain visual line of sight with the sUA (i.e., meet the requirements of 14 CFR § 107.31) at the maximum altitude and distance requested in the waiver application?

The RPIC will be able to accurately determine the sUA altitude, attitude, and direction of flight by using his natural eyesight and depth perception along with the tablet and software provided by the sUA ground control station. The real time display attached to the pilot controller will depict the actual altitude of the sUA in feet above ground level. Geo fencing will be used to be sure that the sUA will not exceed the maximum authorized altitude waived. The visual observer will be able to see the same thing as the RPIC because he has a repeater of the tablet view in his possession to verify that the RPIC does not exceed the altitude limit.

Due to the higher conspicuity that the sUA's have and the close proximity of operation the RPIC will be able to easily determine the attitude and direction of flight.

WSEG Question #4.

- 4. Describe the area of operations using latitude/longitude, street address, identifiable landmarks, or other maps to include the distance from and direction to the nearest airport, (e.g., 4.8 miles SE of XYZ Airport).**

The park area is located in the town of Nowhere USA at the following location: NXX XX XX W XXX XX XX. The NOTAM issued 48 hours in advance will list the location with the longitude and latitude shown as well at the XYZ 329 radial at 29.5 nm. The intended area is a .1 nm circle around the location. We will only be airborne each period of no longer than 10 minutes, to preclude battery exhaustion. Please reference the attached map which was included with the waiver request.

WSEG Question #5.

- 1. Describe how the RPIC will be able to be contacted by Air Traffic Control (ATC) in case the operation needs to be terminated, as well as a procedure to notify ATC when the operation begins and ends.**

Should the flight operation need to be terminated we will have a satellite phone at the site and will have the VO answer the phone in case of a termination request by ATC. The phone number is 202 123-4567.

As a back up to the sat phone a cellular phone contact is 123 456-7890. We have tested the cell phone signal strength at the site and found it to be strong.

Lost Link procedures and loss of control.

Although we have reduced our risk of lost link by decreasing our distance from the sUA and limited our flight duration to only 10 minutes, we will have a contingency plan for lost link such that if we lose control of the sUA. The plan would a verbal warning to other in the area that we have lost control. Then the actual shutdown of the sUA using the control station. Should the sUA go to the limit of the Geo Fence and hover the RPIC will move closer to the sUA and attempt to regain control of shut down if necessary considering any hazard directly below the sUA.

Avoidance of persons plan.

The plan for avoidance of people is to take any photography during the time when construction is not in progress. The park has been closed for several months in preparation for this renovation

so there is typically no people using the park. Should this not be the case prior to flight, the RPIC and VO will place a yellow tape marking around intended flight area and inform people that they will need to stay outside of the barrier for safety. Should they not heed this warning we will discontinue operation until such as time as they are clear of the area.

Conclusion

We have identified the risks and addressed the issues that may pose a threat to this operation and believes that the safety of others will be mitigated in a way that the waiver may be issued.