**1. Drones**

**1.1 SFOC Certificate**

According to Transport Canada, the SFOC “contains conditions specific to the proposed use, such as maximum altitudes, minimum distances from people and property, operating areas, and coordination requirements with air traffic services.” There are a “number of SFOC application processes depending on the nature and use of the UAV,” and “the more complex and risky the proposed operation, the more thorough and onerous the application process.” Essentially the most important aspect of the SFOC application is the operator’s proof to Transport Canada that he/she will be operating the drone safely and not disrupting air traffic.

The application for an SFOC for the purpose of operating a UAV requires the following information:

1.1 (a) the name, address, and where applicable, the telephone number and facsimile number of the applicant;

1.2 (b) the name, address, and where applicable the telephone number and facsimile number of the person designated by the applicant to have operational control over the operation (Operation Manager);

1.3 (c) methods by which the Operation Manager may be contacted directly during operation;

1.4 (d) the type and purpose of the operation;

1.5 (e) the dates, alternate dates and times of the proposed operations;

1.6 (f) a complete descriptions, including all pertinent flight data on the aircraft to be flown

1.7 (g) the security plan for the area(s) of operation and security plan for the area(s) to be overflown to ensure no hazard is created to persons or property on the surface;

1.8 (h) the emergency contingency plans to deal with any disaster resulting from the operation;

1.9 (i) the name, address, telephone and facsimile numbers of the person designated to be responsible for supervision of the operation area (Ground Supervisor), if different from the Operation Manager during the operation;

1.10 (j) a detailed plans describing how the operation shall be carried out. The plan shall include a clear, legible presentation of the area to be used during the operation. The presentation may be in the form of a scale diagram, aerial photograph or large scale topographical chart and must include at least the following information:

* the altitudes and routes to be used on the approach and departure to and from the area where the operation will be carried out;
* the location and height above ground of all obstacles in the approach and departure path to the areas where the operation will be carried out;
* the exact boundaries of the area where the actual operation will be carried out;
* the altitudes and routes to be used while carrying out the operation;

1.11 (k) any other information pertinent to the safe conduct of the operation requested by the Minister.

**2. Restrictions on Recreational Use**

Recreational drone operators must follow Transport Canada’s safety guidelines and the rules found in the advisory circular on General Safety Practices – Model Aircraft and Unmanned Air Vehicle Systems.

The safety guidelines advise that the following rules be kept in mind before a flight:

2.1 a. Inspect that your model aircraft is ready for flight.

* This means that the aircraft, control station components (hardware, software and firmware) and control links are in a fit for flight condition.

2.2 b. Seek permission from the property owner on which you intend to operate your model aircraft.

2.3 c. Know the classification of the airspace you want to fly in. It would be inappropriate and unsafe for you to operate in airspace with heavy aircraft traffic, such as around airports.

2.4 d. Confirm that there is no radio frequency interference (from a nearby radar site for example) that will interfere with the control of your aircraft.

2.5 e. Have an emergency plan just in case.

* This means know the people and equipment available that could help you respond to an incident, accident, medical emergency, you have a fly-away or if your model aircraft becomes uncontrollable.

These rules also recommend that operators fly their drones during daylight hours and in good weather. During a flight drones should be kept in sight, “where you can see it with your own eyes—not only through an on-board camera, monitor or smartphone.” Drone operators should respect the privacy of others and should not operate the drone “with any dangerous goods or lasers on the aircraft.”

An application for an SFOC for the purpose of flying a UAV has to be “received by the appropriate Regional Transport Canada General Aviation Office, at least 20 working days prior to the date of the proposed operation or by a date mutually agreed upon between the applicant and Transport Canada.”

Where a drone is operated under an SFOC, “in addition to any specific directions respecting operations set out in the SFOC and the underlying application,” the advisory circular on General Safety Practices—Model Aircraft and Unmanned Air Vehicle Systems apply.

**3. Drone Terminology: What is a drone?**

Many people generally understand the term “drone” to describe an aircraft without an on-board pilot, or unmanned aircraft. In effect, the term “drone” is a catch-all term that refers to any vehicle that can operate on surfaces or in the air without a person on board to control it; and that can vary in size, shape, form, speed, and a whole host of other attributes. Footnote 2 A drone can be a model aircraft someone purchases in a store, a mini-helicopter used by some police forces, or a large plane-sized aircraft sent to a war zone.

In the industry, and across different regions, drones are also called Unmanned Air Vehicle (UAV), Unmanned Air System (UAS) or Remote Piloted Aircraft Systems (RPAS). The International Civil Aviation Organization (ICAO) has set a new definition referring to drones as RPAS, which will soon become the recommended term internationally as ICAO moves towards developing standards for member states. The following are definitions associated with the various drone terminology:

UAVs (Unmanned Air Vehicle) UAV are a “power driven aircraft, other than a model aircraft, that is designed to fly without a human operator on board.”

UAS (Unmanned Air Systems) – A UAS is an unmanned aircraft (UA) and all of the associated support equipment, control station, data links, telemetry, communications and navigation equipment, etc., necessary to operate the unmanned aircraft.

RPAS (Remote Piloted Aircraft Systems) – A newly emerging definition coming from the International Civil Aviation Organization that intends to highlight the fact that the systems involved are not fully automatic but always have a pilot in command responsible for the flight.

RPAS describes a remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the design.

Model Aircraft is an aircraft; the total weight of which does not exceed 35kg (77.2 pounds) that is mechanically driven or launched into flight for recreational purposes and that is not designed to carry persons or other living creatures.

While there are some slight differences in their definition, UAV, UAS and RPAS can essentially be used interchangeably to refer to unmanned aircraft and the systems that connect them to their pilots on the ground. Model aircraft on the other hand, are distinctly different from UAVs in the fact that they are used for purely recreational purposes, and thus not covered by regulation. This paper will use the terms UAVs, UAS and RPAS interchangeably or refer to them commonly as “drones.”

**4. Drone Attributes: What can drones do?**

Drones are often referred to as a desirable alternative to manned flights, and it is largely due to their flexibility and unique capabilities. Drones can be a persistent, highly targeted and cheap form of surveillance. Drones can be deployed on demand and can generally stay in the air longer than manned aircraft. They are flexible in terms of the tasks they can perform, they can support high-resolution imagery and sensors, and the “plug and play” payload capability makes them easy to tailor to a specific flight purpose. Furthermore, they can cover vast and remote areas. Some of the advanced surveillance technologies that can be mounted on drones include:

* High-power zoom lenses that could increase the chances of individuals being surveillance from a great distance.
* Night vision, infrared, ultraviolet, thermal imaging, and LIDAR (light detection and ranging) that enables UAVs to detect and enhance detail.
* Radar technologies that can penetrate walls and earth enabling the tracking of individuals even inside buildings, through cloudy conditions and through foliage.

Video analytics technology, which is improving rapidly and would be able to recognize and respond to specific people, events and objects, or even flag changes in routines to identify particular movement patterns as “suspicious.” This could also include things like license plate readers.

Distributed video, whereby a number of UAVs work in concert with multiple video cameras.

Facial recognition or other “soft biometric recognition” that enables the UAV to recognize and track personal attributes such as height, age, gender and skin colour.

**5. DRONE REGULATIONS**

According to Canada’s national aviation authority, Transport Canada Civil Aviation (TCCA), flying a drone is legal in Canada, but we recommend being aware of and compliant with the drone regulations listed below before doing so.

**6. No Drone Zones**

“No drone zones” are areas where it may be unsafe or illegal to fly your drone. When you fly a drone for any reason you should generally not fly:

* around airports and aerodromes
* in busy, populated areas
* in national parks
* over border crossings

You can only fly your drone in these areas for specific purposes by getting permission from Transport Canada. For more information on “no drone zones,”

Commercial drone pilots must obtain a Special Flight Operations Certificate (SFOC) from the TCAA unless they meet the strict safety conditions of the TCAA’s exemptions:

* Must keep the aircraft in the visual line of sight (visual line-of-sight)\*
* Must fly under 400 feet altitude
* Must fly during the day
* Must fly at or below 100 mph
* Must yield right of way to manned aircraft
* Must not fly over people
* Must NOT fly from a moving vehicle

**7. Recreational (Just for fun**)

When drone use is strictly for recreational purposes, it’s subject to rules set forth by the SFOC. They also must yield the right of way to manned aircraft in all cases, and keep the drone within their line of visual sight. Recreational operators must not fly a drone weighing more than 55 pounds without specific certification for it.

The rules listed below apply to those drone pilots flying for recreational purposes with a drone that weighs between 250 grams (.55 pounds) and 35 kilograms (77 pounds). If you’re flying a drone that weighs less than 250 grams (.55 pounds), the TCAA advises you to observe their tips for safe flying.

* You must fly below 90 meters (295 feet) above the ground.
* You must fly at least 30 meters (98 feet) away from vehicles, vessels and the public if your drone weighs over 250 grams (.55 pounds) and up to 1 kilograms).
* You must fly at least 76 meters (250 feet) away from vehicles, vessels, and the public.
* You must fly at least 5.6 kilometers (3.5 miles) away from aerodromes (any airport, seaplane base or area where aircraft take off and land).
* You must fly at least 1.9 kilometers (1.2 miles) away from heliports or aerodromes used by helicopters only.
* You must fly outside of controlled or restricted airspace.
* You must fly at least 9 kilometers (5.5 miles) away from a natural hazard or disaster area.
* You must fly away from areas where its use could interfere with police or first responders.
* You must fly during the day and not in clouds.
* You must keep your drone within your sight at all times while flying.
* You must fly within 500 meters (1,640 feet) of yourself.
* You may only fly your drone if it is clearly marked with your name, address, and telephone number.

Drones weighing more than 0.55 pound must be registered with the FAA to operate, which involves a $5 fee and a requirement to label the aircraft with a registration number.

**8. Expectations of Drone Pilots:**

* Pilots are always responsible for their drone-use and any consequences of their operation. This is the law.
* Pilots should always be in command of their aircraft, fly line-of-sight, and always be ready to take over manual control of a drone, for any event that requires.
* Pilots are adequately trained and comply with local laws.
* Pre-flight checks of both Hardware and Software are performed prior to each flight, to ensure the drone is in suitable condition to safely fly.
* Drone Hardware should not be modified in any way that might void the manufacturer's warranty.
* Pilots operate safely, away from people, and at an altitude high enough to clear obstacles.
* Pilots ensure any software/firmware they are using is up-to-date.
* Pilots are aware of hazards, including terrain, obstructions, wind, rain, and temperature which can negatively impact the performance of their drone and battery.
* Pilots should have adequate insurance to protect themselves and 3rd parties who may be harmed by their activities, with products like DJI Care to cover repair fees for damage sustained during normal use.