Ultralight Pilots Association of Canada

June 5, 2020

Attn: **Transport Canada Remotely Piloted Aircraft Systems Task Force**

Email address: *TC.RPASRegulations-ReglementsSATP.TC@tc.gc.ca*

Re: Notice of Proposed Amendment (NPA) for Remotely Piloted Aircraft Systems (RPAS), Lower-Risk Beyond Visual Line-of Sight (BVLOS) #2020-012.

We have concerns with the RPAS (also called Drones and Unmanned Aerial Vehicles (UAVs)) proposals, especially since the requirement for Transport Canada oversight, by way of a Special Flight Operations Certificate (SFOC), is being relaxed.

The most significant concerns are:

- Heavier RPAS/Drone/UAS up to 650 kg. (a weight increase from 25 kg to 650 kg, fully 25 times the current limit.)
- Flights above 400 ft AGL with no Special Flight Operating Certificate
- Beyond Visual Line Of Sight (BVLOS) operations which do not comply with VFR*
- Population density used as criteria without the necessary information to actually determine the population density centered on the location of the RPAS/Drone/UAV operation.
- A flawed Air Risk assessment that used population density on the ground as a reflection of aircraft traffic above a given location.

In the Executive Summary, the RPAS Task Force states that "the department is proposing a risk based approach that has taken into account the overall safety of people on the ground (Ground Risk) and the users of the airspace (Air Risk).

The Ground Risk assessment appears to be adequate.

However, the Air Risk assessment is flawed. The RPAS task force uses the term 'isolated area' for both Ground and Air Risk giving a flawed result for Air Risk. Ground population density has nothing to do with the amount of air traffic over an area.

Evidence of this can be found on page 13 in the NPA, in the discussion where Air Risk Class A (ARC-a) is defined as ***"isolated areas where there are no traditional aircraft."*** It follows that if there are no traditional aircraft overhead, there is no risk of collision and no hazard to mitigate.

In light of this bias, any Air Risk assessments conducted before the current PART IX regulations were implemented should be critically reviewed before creating any new regulations.

Contrary to the statement on page 13 in the NPA, Transport Canada knows that manned aircraft operate everywhere in Canada and acknowledged that there were approximately 6,000 aerodromes** in 1991. There was 'reliable information' for less than one-third of them; these are registered and listed in the Canada Flight Supplement. Transport Canada acknowledged that more than two-thirds of Canadian aerodromes are not registered. There is no reason to believe that the ratio of registered to unregistered aerodromes has changed.

In 2017, there were approximately 1500 registered aerodromes in the Canadian Flight Supplement. Of these, roughly 250 were certified as airports or heliports. Using the ratio of registered vs unregistered aerodromes from the previous Transport Canada document, there are at least 4,500 aerodromes not listed in the Canada Flight Supplement.

Information Note: Only aerodromes that are located within the built-up area of a city or town or those with scheduled passenger service are required to be certified as airports. CAR 302.01(1)(a) and (b). Owners and operators of thousands of other registered and non-registered aerodromes can elect to certify their aerodrome as an airport, but this is optional. The registration of an aerodrome is also optional.

Current RPAS/Drone/UAV regulations in CARs Part IX do not acknowledge the safety risk to manned aircraft in and around unregistered aerodromes and acknowledge minimal risk in and around registered uncertified aerodromes.

The requirement for RPAS/Drone/UAV operators to locate and avoid unregistered aerodromes was in the original draft proposals for CAR Part 1X, but was omitted from the final rule.

** From JARUS guidelines on SORA Strategic Mitigation Collision Risk Assessment Annex C: "When operating Beyond Visual Line of Sight (BVLOS) a UAS cannot comply with VFR"*

***From Transport Canada's Procedures for the Certification of Aerodromes as Airports, March 1991, Chapter 1 item 1.4.1 "It is estimated that there are over 6,000 aerodromes in Canada; however, reliable data is available for approximately one-third of this total. Where reliable data is available that information is published in the Canada Flight Supplement or the Water Aerodrome Supplement."*

Current Rules

There are many concerns with the current Part IX RPAS regulations in the CARs. Most of them center on the assumption that rural areas do not have any overhead air traffic. Current rules essentially allow RPAS/Drone/UAV operators to ignore non-registered aerodromes in rural areas from which pilots of manned aircraft congregate and fly. This greatly increases the Air Risk of Collision.

RPAS//Drone/UAV operators are currently required to find aerodromes listed in the Canada Flight Supplement or Water Aerodrome Supplement. When one of these registered, uncontrolled aerodromes is located, the RPAS//Drone/UAV operator only has to avoid interfering "with an aircraft operating in the established traffic pattern." CAR 901.47(1). The pilot of a manned aircraft would have a very different perspective on what 'interference' means to him as opposed to what 'interference' means to 'ground bound' RPAS//Drone/UAV operator.

RPAS/Drone/UAV operators are not required to locate unregistered aerodromes or to avoid flight near or over them. They only have to avoid a risk of collision with other aircraft. CAR 901.18. A conversation with area residents in advance of a RPAS/Drone/UAV operation would quickly confirm the existence of one of these unregistered farm strips, but this is not in the regulations.

The lack of concern for air traffic flying from and over rural aerodromes is also reflected in the rules for RPAS/Drone/UAV operations in Class G airspace below 400 ft AGL. This airspace is not sterile! There are helicopters, foot launched powered paragliders, ultralights, agricultural operations, hang glider and paraglider launches, glider flights, balloon launches, sky diving, and flight training, all legally operating in Class G airspace below 400 ft. AGL (other than near or over a built-up area). CAR 602.14(2)(b)

Current RPAS/Drone/UAV rules have worked, mainly because of physical and operating constraints in the regulations, including SFOCs for operations using RPAS/Drone/UAS heavier than 25 kg, that go higher than 400 ft AGL, and operate BVLOS. The current rules give RPAS/Drone/UAV operators a chance to hear, see, and therefore avoid manned aircraft that might be operating in the same area.

The new proposals will allow heavier RPAS/Drones/UAV to fly higher and to operate Beyond Visual Line of Sight (BVLOS) without the Transport Canada oversight of a SFOC. RPAS/Drone/UAV operators 'cannot comply with

VFR'* and are therefore essentially 'flying blind,' they will not see a manned aircraft, which means that BVLOS operators are less unlikely to see and avoid it a manned aircraft.

This greatly amplifies the concerns of pilots of manned aircraft and significantly adds to the risks of collision for both RPAS/Drones/UAV and manned flights.

Incident Data
The current RPAS rules came into effect just one year ago on June 1, 2019. There has not been sufficient time for Transport Canada or the TSB to get robust accident data for the current regulations or to begin to assess the added risks of the new proposals.

In Nav Canada's CADORs database, there were 161 incidents involving unmanned aerial vehicles in the year between June 1, 2019 and June 2, 2020. The majority of these involve close proximity to manned aircraft. These reports are primarily from Nav Canada facilities where air traffic control services are a mitigating factor in reducing the risk of collisions with manned aircraft at these airports. This extra risk mitigation is not available at the vast majority of Canadian aerodromes which are uncontrolled and uncertified.

There were also TSB occurrence reports involving RPAS/Drones/UAV over the same time period; however, the total number is not known. The following is an example of one TSB of a manned aircraft - RPAS collision:

> *TSB Report #A20P0019: C-GMPN, an Aerospatiale AS350-B3 operated by RCMP Air Services, was conducting policing activities 24nm SW of Houston (CAM5), BC with 3 persons on board. Also operating in the area were two RCMP operated RPAS units. During low level flight (below 300 feet AGL), the helicopter and 1 RPAS (FLIR SkyRanger R60 - 2.4 kg) collided. The helicopter suffered some initial vibration and the pilot completed a precautionary landing on a road without further incident. Maintenance staff found damage primarily to the main rotor blades along with superficial damage on the tail boom and tail rotor. ... The RPAS was destroyed. There were no injuries to persons in the aircraft or on the ground.*

Evidence from this accident shows that a collision with a RPAS, even one that is small and light weight (2.4 kg), can cause serious damage to a manned aircraft.

Before new, expanded, and expansive RPAS/Drone/UAV rules are imposed, unmanned aerial vehicle incident and accident data from the previous year should be studied to see if the original justification and intent of the current Part IX regulations were met. This study should be made public.

SORA – Ground Risk of Collision
The current rules for RPAS/Drones/UAVs appear to have adequately identified the hazards and mitigations for the Ground Risk of Collision outside of 'built up areas,' and near and over people. The new rules have expanded on this and population density will be the main determinant for operating requirements.

However, the availability and validity of population density data for the small geographic area (1 km^2) pinpointed at around the location of a RPAS/Drones/UAV operation have yet to be determined.

SORA – Air Risk of Collision
For pilots of manned aircraft, the current RPAS/Drone/UAV regulations have not adequately addressed the Air Risk of Collision, especially in Class G airspace at, near, and over registered and non-registered aerodromes.

It is extremely concerning to manned aircraft pilots that statements in the proposals show that the Task Force still considers Class G airspace in rural areas devoid of manned aircraft.

Any analysis of Air Risk of Collision (ARC) must include the reality that there are Canadian aircraft operating in Class G airspace below 400 ft AGL and at or near unregistered aerodromes in rural.

NOTE: In the NPA, the term 'isolated area' is a reference is to population density. This is a Ground Risk not an Air Risk! The term 'isolated area' should not be part of any Air Risk discussion. The statement above suggests that the term is being used interchangeably in both Ground Risk and Air Risk discussions.

Proposed rules - *Operating Heights*
The JURAS SORA (risk assessment tool) is based on the European experience which has a 500 ft AGL floor for manned operations. This has not been adjusted for the Canada where manned flight under 500 ft AGL, in non-built up areas, is legal. CAR 602.14(2)(b)

Canadian airspace below the current 400ft AGL RPAS/Drone/UAV ceiling is not empty. Helicopters, agricultural operations, ultralights, foot launched powered paragliders, hang glider and paraglider launches, glider flights, balloons, sky divers and flight training can all legally operated in this airspace.

The risk of collision is somewhat mitigated, since RPAS/Drone/UAV VLOS operations are limited to a ceiling of 400 ft AGL, and restricted to RPAS/Drone/UAV weighing 25 kg, or less without an operating certificate. These limits give RPAS/Drone/UAV operators a reasonable chance to hear, see, and therefore avoid manned aircraft that might be operating in the same area.

However, this mitigation disappears when weights are increased, heights are unlimited, and Beyond Visual Line Of Sight operations are allowed, especially when BVLOS operations are like flying under IFR rules in the same airspace that manned aircraft operate under VFR.

Proposed rules - *Weight limits*
The RPAS task force used the highest advertised weight for U. S. Light Sport Aircraft as the upper weight limit proposed for RPAS/Drone/UAV. However, there are other numbers for these aircraft groups. See page 7 of the NPA, "*weight thresholds for Light Sport Aircraft and Ultra-light aircraft"*:

- In the U.S. the FARs for Light Sport Aircraft show a top weight of 600 kg with an additional 50 kg for a float allowance.
- Canadian Basic Ultralights have a max take-off weight of 546 kg, well below the max RPAS weight of 650 kg.
- Canadian Advanced Ultralights have a max takeoff weight of 560 kg also well below the max RPAS weight of 650 kg.
- In Canada, most of the early Amateur Built Aircraft also have a max take-off weight of 546 kg as do many early type-certified aircraft.
- The empty weight of U.S. FAR 103 Ultralight Vehicle is 115 kg.

There are a number of 'max weight' limits the RPAS Task Force could have chosen; but it chose to align with the U.S FARs rather than with Canada's CARs in choosing a weight that exceeds Canadian limits for aircraft operating without a Certificate of Airworthiness.

Increasing the weight of an RPAS/Drone/UAV 25-fold, from 25 kg to 650 kg, (which is heavier than many manned aircraft) and allowing them to operate without oversight in the same uncontrolled airspace as many manned aircraft, creates a serious safety issue. Safety is further degraded with the simultaneous elimination of the SFOC for these RPAS/Drone/UAV operations.

Proposed rules - *Speed and Kinetic Energy*
Speed is part of the formula for kinetic energy and it should be a factor in determining the RPAS/Drone/UAV weight cut-offs. Speed's effect on energy increases exponentially, while weight's effect increases linearly.

To illustrate this, a bullet thrown by hand has a relatively slow speed and will not cause any damage. When that same bullet is fired from a gun, the much higher speed of the bullet has a lethal effect.

Collision avoidance is more difficult with the higher weight and speed; there is less time to see another aircraft and less time to take measures to avoid it.

Speed needs to be included in the task force's determination of the weight cut-offs. As speed and weight increase, the closing distance between two aircraft also goes up; this dramatically reduces the chance of avoiding a collision and increases the risk of injury or death should a mid-air occur.

Current regulated speed limits take into account the kinetic energy involved in the operation of these aircraft:

- Canadian Ultralight aeroplanes (Basic and Advanced) have a max stall speed of 45 mph.
- U.S. Light Sport Aircraft have a max stall speed of 52 mph and a max cruise speed is 140 mph.
- U.S. ultralight vehicles have a power-off stall speed of 28 mph or less and a max cruise speed of 63 mph.

As well, JARUS SORA analyses include kinetic energy in their assessments, while the RPAS task force which uses this assessment tool, does not. On page 7 of the NPA the task force states "*It is acknowledged that the JARUS SORA relies heavily on kinetic energy; however, TC's proposed approach focuses on the weight of the RPA rather than kinetic energy*."

Since the RPAS Task Force acknowledges that the JARUS SORA relies heavily on kinetic energy, and since kinetic energy and speed are ignored in the proposals, any risk analyses using SORA will have questionable validity.

Situational Awareness

Potential collision with another aircraft is a normal hazard of flying and pilots are continually scanning for other aircraft to avoid mid-airs. Operators of manned aircraft fundamentally agree to a shared, mutual, 'pilot to pilot' risk. They know the rules and trust that other pilots also know and follow them, particularly for right of way. This is comparable to the automobile sector when both drivers 'agree' to stay on the right side of the road where closing speeds can be high and the distance between automobiles is small. It's a known risk and is accepted by both parties.

Normally there are at least two people looking out for potential conflicts (the pilots of both manned aircraft). In control zones with air traffic control, the controller also helps with collision avoidance. However, there is limited, shared situational awareness between the operator of a RPAS/Drone/UAV and the pilot of a manned aircraft.

The profile and planform of a circular RPAS/Drone/UAV (multi-copter type drone) make it very difficult for the pilot of a manned aircraft to see it and to determine in which direction it is going or how fast. This makes it hard to know what evasive action to take until the RPAS/Drone/UAV is relatively close. This can be especially dangerous if the pilot of a manned aircraft uses an extreme manoeuvre in his attempt to avoid the RPAS/Drone/UAV.

All of the risk in a collision is borne by the pilot of the manned aircraft. The RPAS/Drone/UAV operator will not suffer physical injury; he has no 'skin in the game.' There is no mutually shared risk of collision

With RPAS/Drone/UAV operations in Class G airspace, a pilot in a manned aircraft does not know if he can count on the RPAS/Drone/UAV operator to see or hear him; and he does not know what the RPAS/Drone/UAV operator can or will do to avoid a collision.

BVOS is an added risk for pilots of a manned aircraft. This is not true for BVLOS operators, where the biggest hazard is losing contact with the unit. This is especially egregious to pilot of manned aircraft since the requirement for notification appears to have been dropped along with the requirement to obtain an SFOC.

It will be hard for RPAS/Drone/UAV operators using BVLOS to detect other aircraft with their eyes or with radar, which is often unreliable in detecting small wood or tube and fabric aircraft with no electrical systems. Many manned aircraft pilots still fly without radios (NORDO) and avoid other aircraft using the 'see and be seen' method.

Plus, Detect And Avoid systems will not be required for RPAS/Drone/UAV BVLOS operations in isolated areas (ARC-a).***

*** *From page 13 of the NPA "In areas that fall under Air Risk Class – A (isolated areas where there are no traditional aircraft), there will be no DAA requirements."*

Alignment with the CARs

There is one other issue that needs to be addressed; alignment with the CARs which is a stated objective in the NPA on page 7: "*TC's proposed approach focuses on … alignment with the framework in place in the CARs for aircraft with a pilot on board."*

The above statement referred to RPAS/Drone/UAV weight as a cut-off determinant; the previous discussion on weight limits and speed shows that alignment with the CARs in this matter was not accomplished.

There is at least one other CARs alignment issue; that is the distinction between commercial and non-commercial activity. RPAS/Drone/UAV regulations currently make no distinction between the two. While Transport Canada makes a very clear distinction between the two uses in the regulations for manned pilots.

For example, a private pilot cannot charge a passenger for a flight; until recently, he could not even ask for partial or full reimbursement of expenses. For commercial operations, the pilot must have a commercial pilot license and the aircraft has to be maintained to a higher standard by an AMO.

With increased weights and operating allowances for RPAS/Drone/UAV and to align with the CARs for manned aircraft, the proposed new rules should revisit the decision not to distinguish between commercial vs non-commercial use of RPAS/Drones/UAV.

Summary

All of the issues – heavier RPAS/Drone/UAV operating above 400ft AGL, RPAS/Drone/UAV operations in areas defined as 'isolated' but where aircraft operations exist, the lack of situational awareness on the part of BVLOS operators, and questionable assumptions of Air Risk - create a potentially hazardous flying environment when RPAS/Drone/UAV operations are active.

This combination of hazards and questionable Air Risk analyses is a fundamental safety issue for both the RPAS/Drone/UAV operator and the pilot of a manned aircraft. Air Risk analyses should be repeated using relevant air traffic, rather than population density data from Ground Risk analyses.

Failure to satisfy the level of care due to pilots and passengers of manned aircraft by Transport Canada could lead to serious negative consequences.

The comment period for the NPA should be extended the RPAS Task Force should involve subject matter experts from the rest of the aviation community, not just those in the unmanned aerial vehicle community, in the discussions.

Submitted to the RPAS Task Force on behalf of the Ultralight Pilots Association of Canada
Kathy Lubitz,
President