VANCOUVER FLIGHT INFORMATION REGION UAV BEST PRACTICES FOR AIR TRAFFIC SERVICES COORDINATION

BETWEEN: NAV CANADA - VANCOUVER FLIGHT INFORMATION REGION

AND

UNMANNED AIR VEHICLE OPERATORS
WITHIN THE VANCOUVER FLIGHT INFORMATION REGION

SUBJECT: AIR TRAFFIC CONTROL FRAMEWORK AND RECOMMENDED PROCEDURES FOR THE OPERATION OF UAV.

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This document is issued for Unmanned Air Vehicle users and operators within the VANCOUVER Flight Information Region under the authority of the General Manager for the VANCOUVER Flight Information Region, NAV CANADA.

SIGNATURE

John Reid
GMFIR, VANCOUVER
NAV CANADA
Effective September 1, 2016

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1 BACKGROUND

1.1 NAV CANADA is the company that owns and operates Canada's civil air navigation service (ANS).

We manage 18 million square kilometres of Canadian and oceanic airspace. With 40,000 customers and 12 million aircraft movements a year, we are the world's second-largest air navigation service by traffic volume.

As a private company, our revenues come from our aviation customers, not government. By investing in technology and controlling costs, we have kept customer rates stable while improving safety and flight efficiency.

Our dedicated employees provide services to commercial and general aviation from facilities throughout Canada. Safety is our top priority. These services include air traffic control, flight information, weather briefings, aeronautical information services, airport advisory services and electronic aids to navigation.

Our facilities include area control centres (ACC), airport control towers, flight service stations (FSS), flight information centres (FIC), and Community Aerodrome Radio Stations (CARS). We maintain a network of more than 1,000 ground-based navigation aids across the country.

Safety is our top priority. As such a coordinated and secure UAV integration process into the Canadian air system is part of our mission. Collaboration between UAV users and NAV CANADA will assist in the facilitation of the safe movement of aircraft in Canada.

More and more people are using unmanned aircraft for work or pleasure. Transport Canada regulates their use to keep the public and our airspace safe. NAV CANADA manages operations and executes the day-to-day operational control and management of flight operations.

Aircraft without a pilot on board go by many names—unmanned air vehicle (UAV), remotely piloted aircraft system, model aircraft, remote control aircraft, and drone. In Canada, we currently use the term "Unmanned Air Vehicle" for all groups, except model hobbyists.

UAV users are responsible to fly their aircraft safely and legally. In Canada, users must:

- Follow the rules set out in the Canadian Aviation Regulations.
- Respect the Criminal Code as well as all municipal, provincial, territorial and federal laws related to trespassing and privacy.
- Be responsible partners and users within the Air Navigation System, coordinating operations with NAV CANADA and the Department of National Defence (DND)/Canadian Armed Forces (CAF) as appropriate.

2 PURPOSE:

2.1 NAV CANADA, in seeking to collaborate and coordinate with UAV operators in the interest of flight safety, has prepared this document to outline and address issues unique to UAV operations, within the perspective of Air Traffic Control and Air Navigation Services.

2.2 Within the Vancouver Flight Information Region (VR FIR), NAV CANADA will furnish upon request an *Air Traffic Control Best Practices* document for all UAV users with a Special Flight Operations Certificate (SFOC) registered with the VR FIR.

2.3 As each SFOC and operator has distinctly different requirements and parameters, this will better serve the UAV community in safely coordinating with NAV CANADA.

2.4 This document shall serve to coordinate and communicate across the Vancouver Flight Information Region the following generic UAV issues;

- ATC Expectations,
- Coordination and communication expectations,
- Emergency contact information, and
- Location of additional aviation safety relevant data and resources.

3 DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

For the purposes of this document, unless the context otherwise requires, the following terms will have the respective meanings set out below and grammatical variations of such terms will have the corresponding meanings:

"Party" means NAV CANADA or UAV user and "Parties" means both of them.
"Safety Officer" means the individual with responsibility for operational coordination and communication with NAV CANADA.
"Unmanned Air Vehicle" means any power-driven aircraft, other than a model aircraft, that is designed to fly without a human operator onboard.
"Fly-away" means an interruption or loss of the command and control link where the pilot is unable to affect control of the aircraft and the aircraft is longer following its preprogrammed procedures resulting in the UAV not operating in a predictable or planned manner.
"Defence establishment" any area or structure under the control of the Minister of National Defence, and the materiel and other things situated in or on any such area or structure. (subsection 2(1) of the *National Defence Act*)

3.2 ACRONYMS

ACC	Area Control Centre
ASL	Above Sea Level
ATS	Air Traffic Services
AGL	Above Ground Level
CYR	Canadian Restricted Airspace
DND/CAF	Department of National Defence/ Canadian Armed Forces
FIC	Flight Information Center
FIR	Flight Information Region
FSS	Flight Service Station
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
MANOPS	Manual of Operations
NOTAM	Notice to Airmen
NM	Nautical Miles
SFOC	Special Flight Operations Certificate
TC	Transport Canada
TP	Transport Canada Publication
UAS	Unmanned Aircraft System
UAV	Unmanned Air Vehicle
UPS	Unit Procedures Specialist
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

3.3 COMMON LOCATION IDENTIFIERS

CYVR	VANCOUVER
CYHC	VANCOUVER HARBOUR TOWER
CYYJ	VICTORIA
CYKA	KAMLOOPS
CYLW	KELOWNA
CYXS	PRINCE GEORGE
CYCD	NANAIMO
CYQQ	COMOX
CYCD	NANAIMO
CYXX	ABBOTSFORD

4 COORDINATION OF DATA

4.1.1 All distances and units of measure for aviation purposes shall be listed and communicated in NM, Nautical Miles, feet or inches. Below two nautical miles, distances from aerodromes may be identified with decimals. Distances below one nautical mile may be identified in feet or in nautical mile. (1 NM=1.151 miles, 1 NM=1.852 km, 1KM = 0.54 NM)

Distances should be measured from the aerodrome facility reference point, as listed in the CFS (see 9.2.1), or from a listed Aviation Navigation facility such as a VOR or NDB.

4.1.2 All altitudes and elevation measurements for aviation purposes shall be listed and communicated in feet. (1 meter = 3.281 feet)

4.1.3 All position locations for aviation purposes shall be expressed in the following formats'

- For Planning and NOTAMs; in non-GPS Lat/Long, as expressed in Deg.Min.Sec. (eg; N53 18 36 W113 34 46)
- For Emergency coordination with ATS units, in a position report expressed by distance in NM and direction in compass rose points from the nearest published Aerodrome/Heliport. (eg; 4.5NM E-N-E of CYXX)

5 DESCRIPTION OF AREAS

5.1 The Vancouver Flight Information Region covers the airspace mainly above the central and southern part of British Columbia. The Vancouver FIR lies above some of Canada's most challenging terrain; the Rocky Mountains as well as the Coastal Mountain Ranges. Vancouver FIR also has major airports such as Vancouver (CYVR), Kelowna (CYLW), Abbotsford (CYXX), Victoria (CYYJ) and 19 Wing Comox (CYQQ).

5.2 The Vancouver Flight Information Region delivers Air Navigation Services focused on aviation safety through several points of contact. They Include:

5.2.1 Vancouver Area Control Center (VR ACC) - The ACC is responsible for the provision of control services via radar, multilateration (MLat) and satellite for IFR operations, largely during the enroute phase of flight and for positive control of high density aviation traffic areas, such as in the vicinity of major airports served by commercial carriers. This facility includes a Terminal Control Unit for Vancouver International Airport, Victoria International Airport and Abbotsford International Airport.

5.2.2 Control Towers - The Vancouver region contains ten towers; Vancouver (CYVR), Victoria (CYYJ), Boundary Bay (CZBB), Abbotsford (CYXX), Pitt Meadows (CYPK), Langley (CYNJ), Prince George (CYXS) Vancouver Harbour (CYHC) and 19 Wing Comox. Towers are responsible for all aircraft operations within their respective Control Zones (CZ) which are defined in the Canada Flight Supplement (CFS) or in the Designated Airspace Handbook (DAH).

5.2.3 Flight Service Stations (FSS) - The Vancouver Region has many stations for contact and coordination. They include, but are not limited to CYZT, CYBL, CYCD, CYWH, CYKA, CYYF, CYCG, CYXC, CYWL, CYYD and CYXT. FSS are responsible for all aircraft operations within 5NM of the associated facility, from the ground up.

5.2.4 Kamloops Flight Information Center (FIC) - The FIC is the central point of contact for UAV operations in the planning phase, delivering such services as the issuance of NOTAMS, initial consultation for coordination, and weather briefings.

5.2.5 Comox Military Terminal Control Area (MTCA). 19 Wing Comox ATC is responsible for military and civilian aircraft operations within the MTCA and CZ as defined in the Canadian Flight Supplement (CFS / GPH205) and/or in the Designated Airspace Handbook (DAH). Additionally, Comox provides ATC services for aircraft operations into and out of Campbell River (CYBL) and

Powel River (CYPW) as well as enroute services for IFR and VFR traffic along the eastern edge of Vancouver Island and Georgia Strait.

6 ATC / ANS EXPECTATIONS

6.1 UAV user integration into Canada's Air Navigation System must be done in a safe, orderly manner. While Transport Canada is our regulator, the daily operational impact of Air Traffic Control and flight operations is managed by NAV CANADA. While an SFOC provides the regulatory authority to be able to operate your UAV within prescribed conditions, it does not assure operational safety on a tactical basis. Operational safety assessments and impact reviews are made on all aviation operations. As collaborative aviation partners, NAV CANADA and Transport Canada expects UAV users to coordinate and communicate UAV operations where a potential impact to flight safety exists. To that end, the following paragraphs outline areas of concern, procedures, and expectations for UAV operations within the Vancouver FIR. Additionally, as partners in safety for the Canadian aviation system, NAV CANADA requests a copy of user SFOC's for tracking and contact info. With this information, we will be able to effectively communicate with the UAV user community for flight safety and coordination topics as required within the Air Navigation System.

It is the user's responsibility to understand and apply this document.

6.1.1 For UAV operations in the vicinity of Vancouver International Airport, when authorized to do so by Transport Canada within a SFOC, NAV CANADA expects the following unless otherwise coordinated, by addendum. For operations within 7 NM of CYVR, contact CYVR tower. For planned or tactical UAV operations within 7 – 12 NM from CYVR, and above 300' AGL, the Vancouver Terminal Control Supervisors at the ACC expect notification and coordination. Note that the Vancouver Harbour Tower Control Zone (see **6.1.3**) covers English Bay, First Narrows, Coal Harbour, Second Narrows and Vancouver Downtown so the contact in this area would be the Harbour Tower Manager. Contacts are listed in ANNEX A. Each applicable unit will require the planned UAV operation date, time, location, altitude, and contact information a minimum of 72 hrs in advance. Preliminary assessments for safety will be coordinated at that time. Within 30 minutes of the planned UAV operation, the appropriate NAV CANADA coordination point further requires a final contact for operational approval and a confirmation contact once the UAV operation has concluded. UAV operations coordinated with UAV users by the Tower will be shared with Vancouver Terminal Control at the ACC.

6.1.2 As previously indicated, many facilities within the VR FIR have Air Traffic Control Towers. They include CYVR, CYYJ, CYHC, CZBB, CYPK, CYNJ, CYXX, CYXS, CYLW and CYQQ. CYVR is addressed above. Towers are Air Traffic Control units that deliver positive control to maintain a safe, orderly, and expeditious flow of air traffic. This means that all aviation users require prior authorization to enter and operate in a Towers area of responsibility. Typically this area is a 5NM ring around the facility (however there are many control zones larger than this, some smaller and some of an irregular shape), and

altitude from the surface to 6500' AGL. NAV CANADA Towers expect timely coordination with UAV users. When permitted by SFOC, contact the appropriate tower for operations within 5 NM of any tower at any altitude. Contacts are listed in ANNEX A. Each will require the planned UAV operation date, time, location, altitude, and contact information a minimum of 72 hrs in advance (possibly more if activity is planned on a weekend). Preliminary assessments for safety will be coordinated at that time. Within 30 minutes of the planned UAV operation, the appropriate NAV CANADA coordination point further requires a final contact for operational approval and a confirmation contact once the UAV operation has concluded. Some ATS Units may require a more immediate notification i.e. less than 30 minutes. UAV operations coordinated with UAV users by the Tower will be shared with the ACC as required.

6.1.3 **CYHC CZ** – The Vancouver Harbour Control Zone is a very popular area for UAV operations, however the airspace is also very unique and routine operations are often in conflict with requests for UAV operations. UAV are accommodated as much as operationally possible, but only when timely and effective coordination with the tower supervisor (Unit Operations Specialist – UOS) is completed. Tower staff are not able to conduct advance coordination as they are engaged in active control duties. The UOS normally works Monday to Thursday from 07:00 to 15:30 LCL. Occasionally the UOS takes leave. Coordination needs be initiated as soon as possible within normal working hours and must include: SFOC, dates and times (some ranges of dates and time acceptable), location, maximum altitude requested, purpose of flight, a contact number for your spotter that is guaranteed to be reachable while operating your UAV. Successful coordination results in the control staff being briefed about your operation. As explained above, the airspace is unique and operations are not focused entirely on an aerodrome in the centre of the Control Zone; it is entirely possible to have regular air traffic fly in the least expected places. For this reason specific restrictions may be imposed and these restrictions may well be less than requested. These restrictions are meant to help separate UAV operations from regular air traffic as well as to ensure that tower staff are more likely able to accommodate your operation. Successful coordination with the UOS does not ensure you will be able to fly. In some cases you will be instructed to contact the tower for final approval and this may be denied for a variety of reasons. In other cases you will be restricted into a volume of airspace that does not require you to contact the tower before flying.

6.1.4 **Flight Service Stations** are the most common Air Traffic System facility. They maintain close coordination, as appropriate, with other ATS units or concerned agencies. The FSS role is to provide flight services as outlined in their respective site manuals. As knowledgeable local aviation professionals, part of their role is to inform aircraft of conditions, observed or relayed to them by pilots or other reliable sources, which may affect flight safety. This includes UAV operations. Their area of responsibility is usually within 5 NM of served aerodromes, from the surface up to 3000ft AGL. Additionally, many FSS areas include responsibility for flight safety communication and coordination around Waterdromes, or 'airports' for aircraft on water. With a wide diversity of low-

altitude flight operations in dynamic environments, FSS expect timely communication and coordination from UAV users in the vicinity of registered aerodromes. During UAV coordination, they will often request a copy of UAV user SFOC's. When in doubt about the potential impact of your UAV operation, contact with the local FSS can assist to clarify and ensure safe, coordinated operations.

6.1.5 **19 Wing Comox (CYQQ)** is the only military airfield within the Vancouver FIR. 19 Wing Comox conducts no notice / short notice Defence of Canada and Search and Rescue missions and hosts a busy civilian terminal. Additionally 19 Wing Comox, as a defence establishment, has unique security and force protection requirements. The CYQQ CZ is rectangular in shape and extends 15NM (24km) northwest and southeast along the RWY 12/30 axis (parallel the shoreline – Oyster River to Hornby Island). The YQQ CZ extends 7NM (11km) north into the Strait of Georgia (towards Texada Island) and 3NM (5km) south inland (towards the City of Courtenay). The YQQ CZ is from surface to 6000' AGL. When permitted by SFOC, contact 19 Wing Operations (Plans) for operations within YQQ CZ. 19 Wing Comox contacts are listed in ANNEX A, and 19 Wing Operations (Plans) require a copy of the users SFOC, the planned UAV operation date, time, location, altitude, and contact information a minimum of 72 hrs in advance (possibly more if activity is planned on a weekend). Preliminary assessments for safety will be coordinated at that time. Within 30 minutes of the planned UAV operation, 19 Wing Operations requires a final contact for operational approval and a confirmation contact once the UAV operation has concluded. **Caution**: Texada/Gilles Bay (CYGB), Smit Field (CCS6), Comox Lake, and Goose Spit are frequently used by 442 (SAR) Squadron for low level aircraft, helicopter, and SARTECH parachute training.

6.1.6 As the primary point of contact for the Area Control Centre, the Vancouver Shift Manager (SM) is often coordinating or relaying pertinent operational information between air traffic control, and UAV users. Unless otherwise noted, the SM do not normally require or need coordination of operations for UAV missions below 300' AGL and outside of 5 NM from controlled facilities. As the central coordination point they are however, the most common point of initial contact for emergencies such as loss of control, safety threats, or incidents. UAV users are expected to be familiar with sections **4** and **8** during emergency communication and coordination to the ACC Shift Managers.

6.1.7 NAV CANADA expects UAV users to know and understand their requirements to file NOTAM to inform other Aviation system users. Transport Canada will normally determine as to whether a NOTAM is required on a case by case basis. NAV CANADA may also require a NOTAM be filed for some UAV activity. NOTAM, outlined in **8.4**, are filed for distribution with the Flight Information Centre (FIC). The FIC expects NOTAM information, if required (this may be specified in an SFOC or required under CAR's), to be filed per **6.3.2.1** of this document. Further guidance and coordination regarding operations at or near any registered aerodrome listed within the CFS may be found by contacting the FIC.

6.1.8 UAV SFOC EXEMPTIONS have been published by Transport Canada. UAV operations in compliance with these exemptions are not expected or required to coordinate with NAV CANADA. Specifically, this is in reference to daytime UAV flights in good weather, at or below 300 feet AGL, in Class G Airspace, and at least 5 NM away the centre of any aerodrome. In the event of a loss of control resulting in the possible breach of exemption conditions, NAV CANADA would expect and encourage users to be familiar with, and apply, section 8 on Emergency Contacts.

6.2 NAV CANADA reserves and maintains the right to authorize or deny any UAV operation in the interests of flight safety and operational limits. Any restriction or limitation imposed on UAV operations by any ANS representative must be complied with.

COORDINATION AND COMMUNICATION

6.3 PLANNING

6.3.1 Communications between users and Vancouver FIR ATC units for the use and operations of UAV will normally be by telephone. In planning UAV air operations, NAV CANADA requests the following considerations;

6.3.2 NOTAM (see 9.5) should always be filed for any UAV Operation above 500' AGL and/or within 5NM of any Aerodrome, within CYQQ CZ, or within 7NM of CYVR. NOTAM will not normally be issued more than 48 hours in advance of operational start time, but should be out at least 24 hours in advance when able.

6.3.2.1 For FIC contact concerning NOTAM preparation, the following information is pertinent to air navigation services and users;

- Dimensions of UAV Operations area (within 1 NM is considered standard), with reference to the
- Area of Operation, expressed as Lat/Long (Part 2.4), and
- Planned Operational altitudes, in feet (Part 2.4) AGL, and
- UAV Size, and
- UAV Weight (in Lbs), and
- UAV Colour, and
- Date and time of Operation.

User contact information will also be requested including, at a minimum, the UAV operators name and onsite point of contact, i.e. Cell number.

6.3.2.2 When operations are planned to occur within 5 NM of any controlled Aerodrome/Heliport, coordination with the applicable Tower and/or Flight Service Station (FSS) should be done prior to NOTAM being filed. To assure proper safety assessments, NAV CANADA requests at least 24hr prior notice to the affected unit. There are also many private strips, hospital aerodromes, and Waterdromes listed in the CFS that are not controlled by NAV CANADA but with which UAV users must coordinate with locally prior to operations.

6.4 COORDINATION

6.4.1 In keeping with the Air Traffic Control expectations outlined in part **6**, coordination between Air Navigation System Users, including UAV, and NAV CANADA is critical to maintaining the safety of the system. UAV technology is developing rapidly and capabilities of range, speed, and altitude have operational impacts with commercial aviation. Proper coordination begins with the application of parts **6**, **8** and the contacts list attached. The responsibility to assure coordination for UAV operations within or near the ATC system rests with the UAV user. Should your UAV group encompass multiple operators with multiple UAV, coordination may be executed in a more effective manner with the assignment of a user Safety Officer.

6.4.2 NAV CANADA expects coordination from users to be affected in a timely manner, and will endeavour to process, coordinate, and respond to appropriate UAV user requests in a timely, professional manner.

6.4.3 Please keep in mind the complexity of your operation especially airspace complexities when considering lead time for coordination. Providing notification at least 72 hours in advance will help in ensuring your request is approved.

6.5 COMMUNICATIONS

6.5.1 Effective, complete, and timely communication is critical to aviation safety. Communication is a critical issue in all aspects of human interaction, and has been reported to be the major contributing factor into aviation accidents. Communication is essential between all user groups within the Air Navigation System for organizational and managerial performance and success focused on safety. With 40,000 customers, NAV CANADA endeavors to provide a safety focused culture of effective communication, both internally and externally. For the UAV user group, effective communication is a two-way responsibility and can be accomplished in numerous ways. From planning, to operations and emergencies, the following are perspectives on effective and necessary communications within the Air Traffic Control system.

6.5.2 Communication by email.

Preliminary planning and coordination can often be facilitated properly by email. Written accounts of planned exercise help to minimize potential errors and miscommunications. In early stages of coordination, this is the preferred method. Within the VANCOUVER Flight Information region, the central point of contact would be UAV_VR_FIR@navcanada.ca. Once initial contact is made the UAV point of contact will direct your request to appropriate ATS unit manager.

6.5.3 Communication by phone.

Tactical or short term operations may also be communicated to NAV CANADA by telephone in the planning stages. In most operational instances this will be the primary contact method. Used for coordination, operations, and emergencies, the applicable contacts listed in ANNEX A or the CFS, as appropriate, should be utilized.

6.5.4 Communication by other means, including VHF.

While some UAV operators may have VHF capabilities, UAV in Canada do not have radio-telecommunications station permits or aviation registrations yet. As such, at this time, this is not a recommended method of communication between UAV users and NAV CANADA, unless otherwise coordinated. If users are so equipped and trained, maintaining a listening watch of air traffic on the appropriate frequency may increase situational awareness. Interference on Air Traffic Control frequencies is a safety issue, most especially in congested high density traffic areas and as such is prohibited.

6.6 ADDITIONAL REFERENCES

Advisory Circular (AC) No. 600-004

NAV CANADA recommends UAV users review and understand Transport Canada's "Guidance Material for Operating Unmanned Air Vehicle Systems under an Exemption" as found in AC600-004 available online:
http://www.tc.gc.ca/eng/civilaviation/opssvs/ac-600-004-2136.html

7 EMERGENCY CONTACT INFORMATION

There are several instances outside of normal UAV operations which are of concern to Aviation Safety, as managed by NAV CANADA. While every mission and emergency situation will be different, there are different primary contacts for coordination depending upon the nature of the event. From an Air Traffic Control perspective, different potential threats to aviation safety are identified as follows.

7.1.1 Rogue UAV Lateral Fly Away:

In a situation where a UAV loss of control has occurred, or is apparent, and the UAV appears to be travelling horizontally but not climbing, ATC would suggest from an aviation safety perspective that the primary Emergency contact be the nearest Aerodrome, Flight Service Station, or Tower. The Secondary in this case should be the VR ACC Shift Manager at 604-586-4500. Prior to UAV operations, understanding the area and classification of airspace in and around your mission area will assist in the proper identification of potentially affected ATC units.

7.1.2 Rogue UAV Vertical Fly Away:

In a situation where a UAV loss of control has occurred, or is apparent, and the UAV appears to be climbing with minimal or no horizontal travel, ATC would suggest from an aviation safety perspective that the primary Emergency contact be the VR ACC Shift Manager at 604-586-4500. The Secondary in this case should be the nearest Aerodrome, Flight Service Station, or Tower. Prior to UAV operations, understanding the area and classification of airspace in

and around your mission area will assist in the proper identification of potentially affected ATC units.

7.1.3 In the event of a total loss of control, or otherwise dangerous operational situation, NAV CANADA and Transport Canada expect UAV users to use their best judgement to maintain flight safety. This includes communicating and taking immediate action to mitigate additional risks to the Air Navigation System, and other aviation system users. Follow-up communication and reporting to both NAV CANADA and Transport Canada is mandatory in any of the above instances.

7.1.4 Occasionally, aviation system emergencies or events occur which may require the immediate contact from a NAV CANADA facility to the UAV user. Proper prior coordination including your operational or emergency contact information makes this possible. These instances may include operational limitations imposed on UAV operations, up to and including the immediate grounding of operations. NAV CANADA will expect compliance as fast as practical in these instances.

Communication contact points for administration, planning, coordination, and emergencies, are listed in ANNEX A.

8 Aviation Safety Relevant Data and Resources

The safe operation of UAV as legitimate aviation users integrated into the Air Navigation System operated by NAV CANADA requires understanding and awareness on the part of the user. The following are the most commonly referenced documents and sources for current information. While not exhaustive, these resources will increase UAV user situational awareness, safe integration to Canada's aviation system. In some cases it may be legally required to have these documents present during UAV operations. UAV best practices, from an ATC/ANS perspective, strongly recommend the familiarization, understanding, use, and possession of the following resources be the norm for all UAV operators.

8.1 CFS

The Canadian Flight Supplement is a joint civil-military publication containing information on all Canadian and North Atlantic aerodromes; used as a reference for planning and conducting air operations and updated every 56 days. This publication lists all contact numbers necessary for safe UAV operations and coordination. Available online at:
http://products.navcanada.ca/Products/Aeronautical-Publications

8.2 VNC

The VFR Navigation Chart (VNC) is used by VFR pilots on short to extended cross-country flights at low to medium altitudes and at low to medium airspeeds. The chart displays aeronautical information and sufficient topographic detail to facilitate air navigation through the use of a unique colour scheme, layer tinting, and shaded relief. Available online at:
http://products.navcanada.ca/Products/Aeronautical-Charts

8.3 VTA

The VFR Terminal Charts (VTA) provide detailed information in congested air traffic areas. These are similar in nature to the VNC, however these charts are at a more detailed scale of 1:250,000. Calgary and VANCOUVER are covered in these charts. Available online at:
http://products.navcanada.ca/Products/Aeronautical-Charts

8.4 NOTAM

A Notice to Airmen (NOTAM) is a notice filed with an aviation authority to alert aircraft pilots of potential hazards along a flight route or at a location that could affect the safety of the flight. They can include such items as temporary restrictions, UAV operations, flight dangers, or publication changes. Canadian NOTAM are issued and disseminated by NAV CANADA and are available online at: https://flightplanning.navcanada.ca

8.5 TRANSPORT CANADA

Information regarding the Federal Governments Transportation Regulations, Canadian Aviation Regulations, Special Flight Operations Certificate process, Regulatory Exemptions, and general safety protocols regarding UAV Operations in Canada may be found at: www.tc.gc.ca/safetyfirst

9 TERMINATION

This document shall be reviewed regularly and reissued annually, at a minimum. Possession, understanding, and application of the information detailed within this document shall constitute initial coordination between the user and the NAV CANADA VR FIR. Transport Canada Pacific Region has advised that the attachment of this document certificate (Page 28 of this document) as an Appendix to an SFOC application should meet their requirements of assurance that coordination and dialogue has occurred between the user and the ANS.

Suggestions, edits, and revisions may be submitted to the VR FIR UAV coordination contact at: UAV_VR_FIR@navcanada.ca

10 NAV CANADA UAV COORDINATORS

NAV CANADA Points of Contact are listed in Annex A. For further UAV coordination requirements within the VR FIR, please contact the Site Manager Kelowna.

Paul England (UAV Coordinator): 250-765-4023 UAV_VR_FIR@navcanada.ca

11 DISTRIBUTION LIST AND REGISTRATION

This document is managed and maintained by the Vancouver Airport Operations office, on behalf of the Vancouver FIR General Manager. To assure reliable and consistent coordination, UAV users are requested to register their information and SFOC with NAV CANADA. Registration will provide the user with regular updates of this document, as well as any additional UAV/ATC related consultations in the future. Registration can be made by submitting the following information to the VR FIR UAV Coordinator at paul.england@navcanada.ca , subject “UAV USER”.

USER Corporate Name
USER Operator or Point of Contact Name
USER Address
USER Telephone numbers, Administrative and/or UAV operations number
USER Email
USER SFOC Copy, as available.

Copies of this document will be held on file and updates distributed to the following units/groups;

VR ACC UPS	–	1
ALL VR FIR NAV CANADA OPERATIONAL SITES	–	1
ALL UAV USERS REGISTERED WITH THE VR FIR	–	1
TRANSPORT CANADA PACIFIC REGION	–	1
19 WING COMOX – WING OPERATIONS CENTER 1, ATC 2	-	3
1 CANADIAN AIR DIVISION – SSO ASR	-	1

12 ATTACHMENTS

12.1 The following Attachments form part of this document:

Annex A – Points of Contact

Annex B – Description of Airspace/Map

Annex C – Transport Canada UAV SFOC Exemption Charts

Addendum Template

Proof of Current Document Possession

ANNEX A
Points of Contact

1 NAV CANADA MANAGEMENT

1.1 VANCOUVER ACC, Administrative

Primary Contact email address: UAV_VR_FIR@navcanada.ca

Paul England, Site Manager - Kelowna, VR FIR UAV Contact
Telephone: 250-765-4023

Shift Manager, Area Control Centre Operations
Telephone: 604-586-4500

Greg Dansereau, Manager, Area Control Centre Operations
Telephone: 604-598-4850

2 OPERATIONS

The following numbers are provided for Operational Coordination and Emergency Use Only. Emergency numbers are listed in red.

2.1 NAV CANADA

KAMLOOPS FIC

NOTAMS & Coordination	1-866-WXBRIEF (Toll Free within Canada)
or:	1-866-541-4101 (Toll Free within Canada &US)

VANCOUVER ACC

Shift Manager:	604-586-4500
e-mail	VRSM@navcanada.ca

TOWERS

VANCOUVER Tower CYVR

Planning:	604-775-9531 (UPS) Operations: 604-775-9531 (SUPERVISOR)

VANCOUVER HARBOUR Tower CYHC

Planning:	604-688-2748
Operations:	604-688-9254

ABBOTSFORD Tower CYXX
Planning: 604-557-4431
Operations: 604-855-1199

BOUNDARY BAY Tower CZBB
Planning: 604-940-7125
Operations: 604-946-0911

LANGLEY Tower CYNJ
Planning: 604-514-9324
Operations: 604-534-9443

PITT MEADOWS Tower CYPK
Planning: 604-465-6255
Operations: 604-465-9723

KELOWNA Tower CYLW
Planning: 250-765-4092
Operations: 250-765-3426

PRINCE GEORGE Tower CYXS
Planning: 250-963-7770
Operations: 250-963-9177

VICTORIA Tower CYYJ
Planning: 250-655-2866
Operations: 250-655-2866

19 Wing COMOX CYQQ
Wing Plans: 250-339-8211 local 6976/8443/6017/6016
Tower: 250-339-8211 local 8770
Wing Operations: 250-339-8231

Flight Service Stations (FSS)

CASTLEGAR FSS CYCG
Planning: 250-365-6497
Operations: 250-365-3013

CRANBROOK FSS CYXC
Planning: 250-426-8057
Operations: 250-426-6312

PENTICTON FSS CYYF
Planning: 250-493-2059
Operations: 250-492-3001

WILLIAMS LAKE FSS CYWL
Planning: 250-989-2379
Operations: 250-989-4415

KAMLOOPS FSS CYKA
Planning: 250-376-5128
Operations: 250-376-7941

SMITHERS FSS CYYD
Planning: 250-847-5638
Operations: 250-847-2035

TERRACE FSS CYXT
Planning: 250-635-7918
Operations: 250-635-2110

PORT HARDY FSS CYZT
Planning: 250-902-2653
Operations: 250-949-6331

CAMPBELL RIVER FSS CYBL
Planning: 250-923-0158
Operations: 250-923-3942

NANAIMO FSS CYCD
Planning: 250-245-8133
Operations: 250-245-4032

VICTORIA HARBOUR FSS CYWH
Planning: 250-953-1510
Operations: 250-953-1500

This list is not exhaustive. Additional contacts may be found listed in the Canadian Flight Supplement.

In the case of Emergency, and/or loss of control, contact the nearest ATS unit, followed by the VANCOUVER ACC Shift Manager, Emergency services, and Transport Canada as required.

Insert local numbers as applicable for UAV user quick reference:

LOCAL ATS UNIT:	
VR ACC Shift Manager:	604-586-4500
LOCAL EMERGENCY SERVICES:	
TRANSPORT CANADA;	CAOPac-OACPac@tc.gc.ca

ANNEX B

Description of Airspace

~ NOT FOR OPERATIONAL USE, FOR REFERENCE ONLY ~

VFR Terminal Area Chart – vicinity Vancouver Int'l, Vancouver Harbour, Boundary Bay

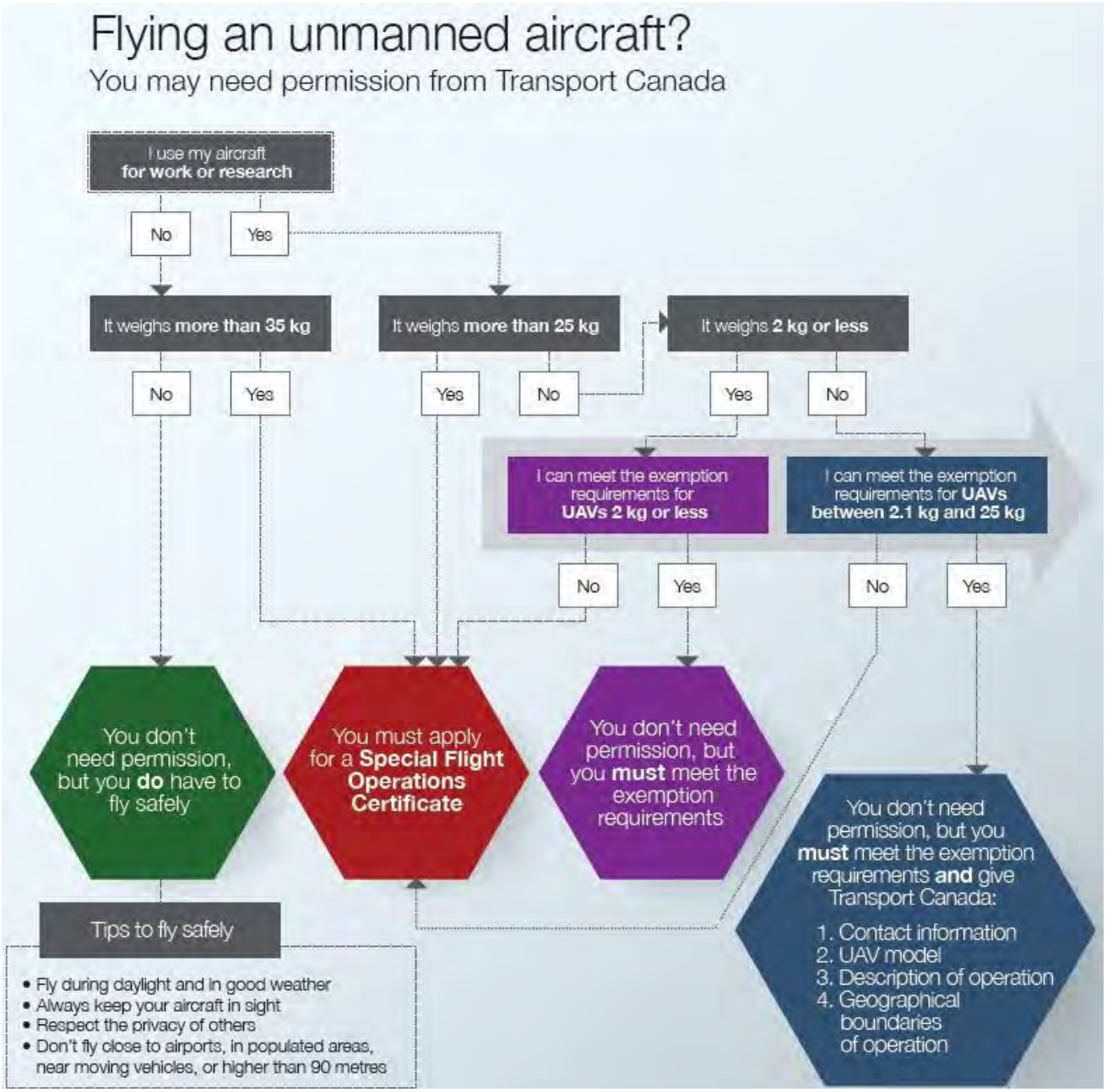
VFR Terminal Area Chart vicinity Pitt Meadows, Langley, Abbotsford

~ NOT FOR OPERATIONAL USE, FOR REFERENCE ONLY ~

VFR Terminal Area Chart vicinity Victoria

NOT FOR OPERATIONAL USE, FOR REFERENCE ONLY –

ANNEX C



TRANSPORT CANADA UAV SFOC EXEMPTION INFOGRAPHICS

VANCOUVER FIR – UAV BEST PRACTICES

Exemption requirements for operating UAVs without permission

THIS INFOGRAPHIC IS FOR EASE OF REFERENCE ONLY. YOU MUST CONSULT THE OFFICIAL EXEMPTIONS.

UAVs 2 kg or less

- Be safe, well trained and know the rules of the sky
- Be 18 years old, or at least 16 years old to conduct research under academic supervision
- Have at least $100,000 liability insurance
- Be alert—not tired or under the influence of alcohol or drugs
- Inspect your UAV and site before flight to ensure they are safe
- Get permission before you go onto private property
- Inform Air Traffic Services if your UAV enters controlled airspace
- Give right-of-way to manned aircraft
- Fly during daylight and in good weather
- Keep your aircraft in direct line of sight and always be able to see it with your own eyes
- Verify that radio frequencies/transmissions won't affect control of your UAV
- Have an emergency plan ahead of time
- Carry a copy of your UAV exemption, proof of liability insurance, contact information, and aircraft system limitations
- Follow the manufacturer's operating and emergency procedures, including those if the remote control loses contact with the aircraft
- Respect laws from all levels of government
- Operate only one UAV at a time, with a single remote control
- Immediately stop all operations if you can no longer meet the exemption requirements or if the safety of a person, property or other aircraft is at risk
- Stay at least 30 metres away from people, animals, buildings, structures, and vehicles not involved in the operation

UAVs between 2.1 kg and 25 kg

- Be safe, well trained and know the rules of the sky
- Be 18 years old
- Have at least $100,000 liability insurance
- Be alert—not tired or under the influence of alcohol or drugs
- Inspect your UAV and site before flight to ensure they are safe
- Get permission before you go onto private property
- Carry a copy of your UAV exemption, proof of liability insurance, contact information, and UAV system limitations
- Respect laws from all levels of government
- Keep your UAV in direct line of sight and always be able to see it with your own eyes
- Operate only one UAV at a time, with a single remote control
- Give right-of-way to manned aircraft
- Fly during daylight and in good weather (no clouds, snow or icy conditions)
- Create and follow procedures for landing and recovering your UAV and for contacting emergency responders and air traffic control.
- Have an emergency plan ahead of time
- Follow the manufacturer's operating and emergency procedures, including those if the remote control loses contact with the aircraft
- Verify that radio frequencies/transmission and eletronic devices won't affect control of your UAV
- Assess the risk of losing connection with the UAV and decide when to use the flight termination setting
- Have a fire extinguisher on site
- Inform Air Traffic Services if your UAV enters controlled airspace
- Follow the manufacturer's maintenance/assembly instructions
- Ensure the UAV does not have an emergency locator transmitter
- Report accidents to Transport Canada and stop operations until you have addressed the risks
- Immediately stop all operations if you can no longer respect the exemption requirements or if the safety of a person, property or other aircraft is at risk
- Stay at least 150 metres away from people, animals, buildings, structures, and vehicles not involved in the operation

DO NOT:

- Fly closer than 9 km from forest fires, airports, heliports, aerodromes, or built-up areas
- Fly over military bases, prisons or in controlled or restricted airspace
- Fly over crowds or higher than 90 metres
- Participate in special aviation events, air shows or system demonstrations
- Carry dangerous goods or lasers

tc.gc.ca/safetyfirst

Canada

Transport Canada Transports Canada

ALWAYS

- Fly during daylight and in good weather (not in clouds and fog).
- Keep your aircraft in sight where you can see it with your own eyes.
- Make sure your aircraft is safe for flight before take-off.
- Know if you need permission to fly and when to apply for a Special Flight Operations Certificate.
- Respect the privacy of others – avoid flying over private property or taking photos or videos without permission

DO NOT FLY

- Closer than 9km from an airport, heliport or aerodrome.
- Higher than 90 meters
- Closer than 150 meters from people, animals buildings, structures,or vehicles.
- In populated areas near large groups of people-such as beaches, outdoor concerts, festivals, or firework shows.
- Near moving vehicles-avoid highways, bridges, busy streets or anywhere you could endanger or distract drivers.
- Within restricted airspace, including near or over military bases, prisons and forest fires.
- Anywhere you may interfere with first responders.

Canada

ADDENDUM to VANCOUVER FIR UAV BEST PRACTICES DOCUMENT

BETWEEN

USER

and

NAV CANADA, VANCOUVER FIR

[This page shall be jointly drafted and approved in instances where, within SFOC approval, UAV users wish additional coordination and processes with any NAV CANADA facility. This includes all instances where UAV operations may be closer to ANS sites than outlined in the above best practices or within the operation limitations of the Transport Canada Exemptions. Insert applicable references to clause(s) amended, requirements, coordination, and contacts.]

[Validity Period, issuance, and expiry.]

Signature Date USER authorized party Role Company Address: Telephone: Email:	Signature Date NAV CANADA authorized party Role Unit NAV CANADA Address: Telephone

For the purposes of communication with Transport Canada – Pacific Region – this page, attached as an appendix to an SFOC application, shall constitute evidence of communication and initial coordination between

(insert user name)
and
NAV CANADA VR FIR

for UAV operations including current best practices.

This page comes from the VANCOUVER FLIGHT INFORMATION REGION UAV BEST PRACTICES FOR ATC COORDINATION document.

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