APPENDIX D — STANDARD SCENARIOS

1.0 Background

(1) **General**. As described in Section 3.0 (3) of AC 903-001, TCCA has created a "Canadianized" version of the JARUS SORA process as one means for conducting operational risk assessments in support of applications for SFOC – RPASs. To date, these SFOC – RPAS applications and their associated ORAs have been considered on an individual, case-by-case basis. With the increasing volume of applications for complex SFOC – RPASs, TCCA has chosen to develop a set of Standard Scenarios, in which a generic ORA is carried out by TCCA specialists to create a simplified application process for specific, commonly observed operational use cases. For each standard scenario, TCCA has developed guidance material for operators to use when submitting an SFOC – RPAS application, including information about how to assess an area, and the mitigations and procedures required to support the application. This is covered in further detail in each specific Standard Scenario (STSC) section of this Appendix. Note that for the specific scenarios addressed, these STSCs are intended to replace the full ORA process described in AC 903-001, and they should be used in their entirety without deviation.

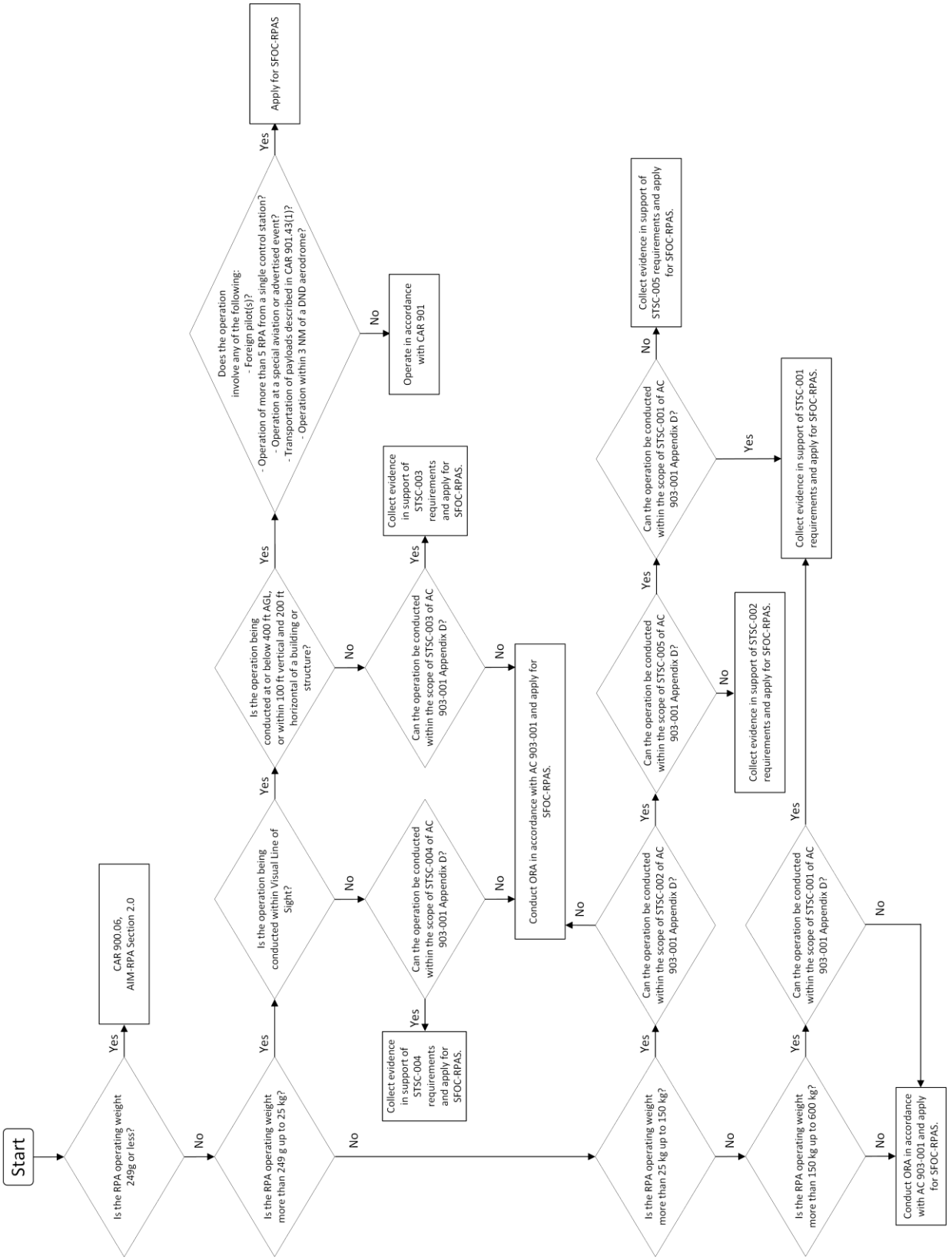
(2) **Usage**. These standard scenarios are provided to assist SFOC – RPAS applicants in preparing their application for an operation that meets the parameters of one of the standard scenarios, and to assist TCCA specialists in reviewing these applications for the issuance of SFOC – RPASs. The standard scenarios (STSCs) currently developed are as follows:

- **(a)** **STSC-001**. Addresses VLOS operation of RPA having an operating weight of more than 25 kg up to 600 kg over controlled ground areas in low risk airspace. (SAIL II)
- **(b)** **STSC-002**. Addresses VLOS operation of RPA having an operating weight of more than 25 kg up to 150 kg over controlled ground areas in any airspace. (SAIL IV)
- **(c)** **STSC-003**. Addresses VLOS operation of small RPA having an operating weight of more than 250 g up to 25 kg in uncontrolled airspace above 400 ft AGL. (SAIL II)
- **(d)** **STSC-004**. Addresses BVLOS operation of small RPA having an operating weight of more than 250 g up to 25 kg over low risk ground areas in low risk airspace using Visual Observer DAA. (SAIL II)
- **(e)** **STSC-005**. Addresses VLOS operation of RPA having an operating weight of more than 25 kg up to 150 kg over controlled ground areas in uncontrolled airspace. (SAIL II)

(3) **Discussion**. These standard scenarios have been developed to simplify SFOC – RPAS application and processing for commonly requested CONOPS with similar characteristics. Thus, over time, the number of standard scenarios may expand to regroup other operations where more regular demand is observed. These scenarios will also provide valuable feed-back to further develop regulations and validate emerging standards and means of compliance (MOC). Therefore, Applicants' feedback will be instrumental in making this endeavor reach its full potential. Such feedback can be forwarded to the contact information provided in AC 903-001 Section 13.0.

(4) **Framework**. The flow chart in Figure 20, below, illustrates the current (as of the date of publication) framework for RPAS operations, including SFOC – RPAS using the standard scenarios in this Appendix. Note that this figure will be updated along with the AC 903-001, but the underlying framework may be updated sooner as lessons are learned from SFOC – RPAS operations. As such, the figure should be considered guidance only and not interpreted as a regulatory statement.

Figure 20 – RPAS Operational Framework



2.0 STSC-001 – 25 - 600 kg RPA, VLOS, Controlled Ground, Low Risk Airspace

(1) **Introduction.** For this standard scenario, TCCA has undertaken an RPAS ORA assessment for a predefined CONOPS involving VLOS operation of RPA having an operating weight of more than 25 kg up to 600 kg over controlled ground areas in low-risk uncontrolled airspace. The primary intended use of this standard scenario is for developmental purposes (for aircraft, technology, training, procedures, etc.); however, commercial operations are also acceptable provided that the conditions and requirements are satisfied (e.g., surveys with large RPA). This standard scenario has not been endorsed by JARUS and is applicable to operations as described in Canadian airspace only.

(2) **Scope.** This standard scenario is intended to be used as part of the application process for an SFOC – RPAS approval. The permissible operational limitations under this scenario are:

(a) RPA having an operating weight of more than 25 kg up to 600 kg.

(b) Ground area:

(i) Must be a minimum[11] of 2 nautical miles outside of any area with a population density greater than 25 ppl/km^2; and

(ii) Must be controlled (ref. AC 903-001 2.3(1)(h)) underneath the entire flight area (i.e., the flight geography per 2.3(1)(k) plus the contingency volume per 2.3(1)(g)), plus a buffer area extending beyond the flight area by 500 feet.

(c) Altitude: No greater than 400 ft AGL.

(d) Airspace can be either:

(i) Uncontrolled airspace, a minimum of 5 nautical miles from the centre of an aerodrome airport or heliport published in the Canada Flight Supplement or Water Aerodrome Supplement AND a minimum[11] of 2 nautical miles horizontally and 1500 ft vertically from any controlled airspace; or

(ii) Class F restricted airspace with permission from the User/Controlling agency.

(3) **Application.** The following sections provide applicants with guidance about the minimum information and evidence required to support an application for operations according to the standard scenario STSC-001. TCCA considers these the minimum requirements for applications under this scenario, and applicants should assess whether higher levels of safety are required based on the complexity of the operation. At minimum, applicants must complete SFOC-RPAS Application Form 26-0835 and associated compliance checklist with all required information and provide attachment(s) with the supporting information described below. More information on SFOC-RPAS application and Compliance Checklist are available from our website.

(4) **Supporting Information.** The following sections provide guidance about the minimum additional supporting information required to demonstrate that an applicant is capable of operating safely within the environment described in this standard scenario. Based on the scope described above, this standard scenario is assigned a SAIL of II and the supporting information is based on requirements at that level. Note that the location of the supporting information / evidence for each of the following points should be identified specifically in the application for this standard scenario.

(a) Operational Considerations. The following table describes the necessary supporting information related to operational considerations (crew qualifications, training, etc.).

[11] Note that these values are minimums, and may be adjusted upwards on a case-by-case basis if aircraft performance and/or emergency procedures dictate that greater values are required.

Topic (SORA OSO #)	Information Required	Guidance
Operator Competency (1)	• Company Operations Manual • Advanced sRPA Pilot Certificates	Note that a document titled "Company Operations Manual" is not specifically required. What is necessary is documentation to demonstrate that operations are conducted in a consistent and standardized manner, along with a process for identifying and addressing any issues identified. Also note that draft documentation could be considered acceptable for this scenario.
Maintenance (3)	• Maintenance Program / Schedule for applicable RPAS(s)	
Pre-Flight Inspection (7)	• Documented Pre-Flight procedure • Evidence that any pre-flight checks required to address Containment requirements as detailed in (c), below, are included	
Operational Procedures (8, 11, 14, 21)	• Evidence that operational procedures have been reviewed, practiced, and updated where required.	For development / testing operations conducted under this scenario, having an ability to review the events of a flight is instrumental to conduct root-cause analysis. For example, videotaping trials allows a vivid and measurable way of conducting a post-event or post-incident analysis, especially when considering factors not otherwise recorded by the RPAS telemetry (e.g.: change in weather; human interactions; etc.).
Crew Training (9, 15, 22)	• Declaration that all crew members have been trained on the topics identified in Appendix C, Section 1.1(3)(a)(ix)(A).	Refer to operational declaration template under item (d), below.
Multi-crew coordination (16)	• Operational Procedures related to crew coordination and communications (can be a reference to a section of the Company Operations Manual).	
Crew Fitness (17)	• Declaration that a crew fitness policy is in place • Crew self-declarations of fitness prior to flight	Refer to operational declaration template under item (d), below.

Topic (SORA OSO #)	Information Required	Guidance
Adherence to RPAS environmental limits (23)	• Declaration that the environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).	Refer to operational declaration template under item (d), below. Note that since the primary safety system in this STSC is the containment system described in in (c), below, this declaration can be interpreted as applying to the containment system only (i.e., the environmental limits in use for the proposed operation will ensure that the containment system functions as intended).

(b) Technical Considerations. The following table describes the necessary supporting information related to technical considerations (RPA design, systems performance, etc.).

Topic (SORA OSO #)	Information Required	Guidance
Manufacturer Competency (2)	• N/A	
RPAS Design Standards (4)	• N/A, but refer to Containment requirements as detailed in (c), below.	
RPAS Reliability (5, 12)	• N/A, but refer to Containment requirements as detailed in (c), below.	
C2 Link (6)	• Details of signal strength monitoring and alerting • Evidence of site survey and/or pre-flight assessment plan for local conditions affecting C2 (e.g., terrain, obstacles, EMI sources, etc.)	
Recovery from technical issues (10) and human error (19)	• N/A, but refer to Containment requirements as detailed in (c), below.	
Adequacy of external systems (13)	• Declaration that any external systems or services in use are adequate for the operation.	Refer to operational declaration template under item (d), below.
Flight Envelope Protection (18)	• N/A, but refer to Containment requirements as detailed in (c), below.	
Human Factors evaluation (20)	• Declaration that the RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.	Refer to technical declaration template under item (d), below.
RPAS environmental design (24)	• N/A	

(c) Containment Considerations. To ensure safety in the case of failure scenarios that could lead to a flyaway, applicants must demonstrate a robust containment solution for their RPA.

(i) The top level requirements that must be met by this system are (sourced from Section 9.4):

(A) No single failure of the RPAS or any external system supporting the operation shall result in operation outside of the operational volume.

(B) Any failure of a system or subsystem whose operation is required to meet (A) shall be detectable by the operator.

(ii) The supporting information that must be provided to substantiate that the RPAS(s) meets the requirement depends on the operating weight of the aircraft, as follows:

(A) For RPA having an operating weight up to 150 kg, a declaration that the RPAS(s) meet the requirements identified above (refer to technical declaration template under item (d), below).

(B) For RPA having an operating weight of more than 150 kg, a declaration as above accompanied by details of the system design, test approach, and testing carried out to validate that the RPAS(s) meets the requirements.

(C) Note that for all sizes of aircraft, the design, test approach, and testing should include consideration of the effects of the following probable failures:

(I) Intermittent or degraded C2 link particularly at or around vertical obstacles or sources of EMI.

(II) Indications, RPA response and crew procedures / actions in the event of a permanent loss of the C2 link.

(III) Total or partial failure of the remote pilot station affecting such systems as electronic displays, video feeds, internet, manual control interfaces etc. caused by software, hardware or power failures.

(IV) Navigation system failures including degradation or total loss of GPS, IMUs, sensors or cameras that may result in a reduction in navigation accuracy and/or a loss of available navigation modes.

(V) Flight planning failures that could result in a loss of containment (i.e. incorrect setting of waypoints / RTH function).

(iii) Examples of potentially acceptable containment approaches include (note that this is not intended to be an exhaustive list):

(A) Geofencing.

(B) Flight termination systems, e.g.:

(I) Software-based return-to-home or autoland functions.

(II) Remote kill switches.

(C) Tethering, either mechanically or as a power source disconnect.

(D) Energy limits (i.e., only carrying sufficient fuel load / battery charge / etc. to reach the edge of the controlled area in a flyaway situation).

(d) Declaration templates:

STSC-001 Operational Declaration

I hereby declare that, for the operation described in the attached application package:

- All RPAS crew members have been trained on the topics identified in AC 903-001 Appendix C, Section 1.1(3)(a)(ix)(A).
- A crew fitness policy is in place, and each RPAS crew member self-declares their fitness prior to acting as a member of the flight crew.
- Any external systems or services in use are adequate for the operation.
- The environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

STSC-001 Technical Declaration

I hereby declare that the RPAS(s) listed below have been developed, constructed, and verified to meet the following technical requirement:

- The RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.
- No single failure of the RPAS or any external system supporting the operation will lead to operation outside of the operational volume.
- Any failure of a system or subsystem whose operation is required to meet the above requirement is detectable by the operator.

Make	Model

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

3.0 STSC-002 – 25 - 150 kg RPA, VLOS, Controlled Ground, Any Airspace

(1) **Introduction.** For this standard scenario, TCCA has undertaken an RPAS ORA assessment for a predefined CONOPS involving VLOS operation of RPA having an operating weight of more than 25 kg up to 150 kg over controlled ground areas in any airspace. While not an exhaustive list, the use cases that may be addressed by this scenario include filmmaking operations, precision agriculture support, and remote sensing applications with payloads requiring larger RPA. This standard scenario has not been endorsed by JARUS and is applicable to operations as described in Canadian airspace only. Note that this scenario is primarily intended to support operations in controlled airspace, and operations being conducted outside of controlled airspace may be possible with less stringent safety mitigations under STSC-001, STSC-005, or a full AC 903-001 ORA.

(2) **Scope.** This standard scenario is intended to be used as part of the application process for an SFOC – RPAS approval. The permissible operational limitations under this scenario are:

(a) RPA with an operating weight of more than 25 kg up to 150 kg.

(b) Ground area: Must be controlled (ref. AC 903-001 2.3(1)(h)) underneath the entire flight area (i.e., the flight geography per 2.3(1)(k) plus the contingency volume per 2.3(1)(g)), plus a buffer area extending beyond the flight area by 100 feet plus the proposed operational altitude in feet AGL (e.g., if the proposed operational altitude is 100 ft AGL, the controlled buffer area beyond the flight area must be 200 ft laterally).

(i) Note that a controlled ground area is not required in areas or directions where uninvolved persons are sheltered by obstacles that would likely not be penetrated by the RPA at maximum speed (e.g., buildings). The default assumption in this standard scenario is that cars, structures, buildings, etc. **do not** provide shelter, but sheltering can be used if an analysis of RPA kinematics and the sheltering object strength show that sufficient safety is provided.

(ii) Note that operational procedures must also dictate that kinetic energy never be directed towards uninvolved and unsheltered persons less than 500 ft from the RPA. The intent of this requirement is to ensure that the detailed planning of the operation within the operational volume ensures that the flight path and turnaround areas of the RPA are arranged such that in the event of a failure, uninvolved people are protected.

(c) Altitude: No greater than 400 ft AGL. Note that lower altitudes reduce the size of the controlled ground area as per above.

(d) Airspace: Any airspace, with permission & coordination when required with the local air navigation service provider and/or controlling agency.

(3) **Application.** The following sections provide applicants with guidance about the minimum information and evidence required to support an application for operations according to the standard scenario STSC-002. TCCA considers these the minimum requirements for applications under this scenario, and applicants should assess whether higher levels of safety are required based on the complexity of the operation. At minimum, applicants must complete SFOC-RPAS Application Form 26-0835 and associated compliance checklist with all required information and provide attachment(s) with the supporting information described below. More information on SFOC-RPAS application and Compliance Checklist are available from our website.

(4) **Supporting Information.** The following sections provide guidance about the minimum additional supporting information required to demonstrate that an applicant is capable of operating safely within the environment described in this standard scenario. Based on the scope described above, this standard scenario is assigned a SAIL of IV and the supporting information is based on

requirements at that level. Note that the location of the supporting information / evidence for each of the following points should be identified specifically in the application for this standard scenario.

(a) Operational Considerations. The following table describes the necessary supporting information related to operational considerations (crew qualifications, training, etc.).

Topic (SORA OSO #)	Information Required	Guidance
Operator Competency (1)	• Company Operations Manual • Advanced sRPA Pilot Certificates	Note that a document titled "Company Operations Manual" is not specifically required. What is necessary is documentation to demonstrate that operations are conducted in a consistent and standardized manner, along with a process for identifying and addressing any issues identified.
Maintenance (3)	• Maintenance Program / Schedule for applicable RPAS(s) • Evidence that maintenance program / schedule is based on manufacturer recommendations and has been validated • Evidence that maintenance personnel have obtained initial training from manufacturer	
Pre-Flight Inspection (7)	• Evidence that the pre-flight procedure is based on manufacturer recommendations • Evidence that any pre-flight checks required to address Containment requirements as detailed in (c), below, are included	
Operational Procedures (8, 11, 14, 21)	• Evidence that operational procedures have been tested and validated by a third party.	Guidance related to third party validations will be provided at a later date in Appendix F of AC 903-001.
Crew Training (9, 15, 22)	• Training Program / Syllabus • Evidence that all proposed crew members have received the necessary training	
Multi-crew coordination (16)	• Evidence that operational procedures have been tested and validated by a third party.	Guidance related to third party validations will be provided at a later date in Appendix F of AC 903-001.
Crew Fitness (17)	• Organizational crew fitness policy • Evidence of fitness policy being enforced (operational logs, rest times, etc.)	
Adherence to RPAS environmental limits (23)	• Evidence that the environmental limits used in operational procedures are less than or equal to the environmental limits specified by the manufacturer	It is advisable to use limits lower than specified by the manufacturer to allow for some operational buffer when local environmental conditions change during an operation.

(b) Technical Considerations. The following table describes the necessary supporting information related to technical considerations (RPA design, systems performance, etc.).

Topic (SORA OSO #)	Information Required	Guidance
Manufacturer Competency (2)	• Details of any industry certifications (e.g., ISO9001) held by the manufacturer • Details of production & service history for the applicable RPAS(s) • Evidence of production conformity	
RPAS Design Standards (4)	• Declaration that the RPAS(s) meet the applicable design standards for this standard scenario (refer to template in (d) below).	The applicable design standards for this standard scenario are: • Containment requirements as detailed in (c), below; and • CAR Standard 922.04 when the operation is being conducted in controlled airspace.
RPAS Reliability (5, 12)	• Refer to Containment requirements as detailed in (c), below.	The operational limitations described in the scope of this standard scenario ensure that the only failure case with safety implications to the public is that of an uncontrolled flyaway. Hence, the containment requirements address the residual technical risk.
C2 Link (6)	• Details of signal strength monitoring and alerting • Evidence of demonstration of C2 link performance in representative operational conditions • Evidence of site survey and/or pre-flight assessment plan for local EMI conditions	Note that a third-party link budget analysis as identified in OSO #6 is not required for this standard scenario due to the constrained operational environment.
Recovery from technical issues (10) and human error (19)	• Refer to Containment requirements as detailed in (c), below.	The primary safety mitigation to ensure recovery from technical issues and/or human error in this specific scenario is the combination of the constrained operational environment and the containment requirements described below.
Adequacy of external systems (13)	• Plan in place and procedures to mitigate deterioration of external services.	For any external systems / services being used, operational procedures must address any action required in case of a loss of these systems / services (e.g., GNSS). A third party review is not required for this scenario due to the constrained operational environment.

Topic (SORA OSO #)	Information Required	Guidance
Flight Envelope Protection (18)	• Refer to Containment requirements as detailed in (c), below.	It is expected that essentially all rotary wing RPA will already incorporate a flight envelope protection system, but it is not strictly necessary for this standard scenario as the safety impact of not having such a system is already addressed by the operational limitations and the containment requirements described below.
Human Factors evaluation (20)	• Evidence that the RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation. • Evidence that the human machine interface has been validated in an environment that is representative of the real world and been shown to be adequate.	This requirement can be met through a formal, documented Human Factors evaluation process or through demonstration of sufficient* operational experience with the human machine interface in similar operational contexts. Note: Sufficient in this case is defined as a minimum of 8 hours of flying time with each of the proposed RPAS types, which may be shared across the proposed operational crew members.
RPAS environmental design (24)	• Declaration that the RPAS(s) can be operated safely throughout the environmental envelope identified in the flight manual (refer to template in (d) below). • Evidence of environmental testing to support the declaration.	The evidence supporting the declaration can be in the form of test reports for specific environmental testing, or records of operational experience in all relevant environmental conditions (e.g., temperature, humidity, wind, EMI).

(c) Containment Considerations. To ensure safety in the case of failure scenarios that could lead to a flyaway, applicants must demonstrate a highly robust containment solution for their RPA.

(i) The top level requirements that must be met by this system are (sourced from Section 9.5):

(A) No single failure of the RPAS or any external system supporting the operation shall result in operation outside of the operational volume.

(B) The probability that the RPA leaves the operational volume due to any combination of failures of the RPAS and/or any external system supporting the operation shall be shown to be extremely remote.

Note: Quantitative probability values associated with “extremely remote” failure conditions referenced here are intended to be scaled with the kinetic energy of the RPAS as described in Appendix E.

(C) Any failure of a system or subsystem whose operation is required to meet (A) or (B) shall be detectable by the operator.

(D) Software (SW) and Airborne Electronic Hardware (AEH) whose development error(s) could directly lead to operations outside of the

operational volume shall be developed to an industry standard or methodology recognized by TCCA (ref. AC 922-001 Appendix A).

(ii) The supporting information that must be provided to substantiate that the RPAS meets the requirements is:

(A) A declaration that the RPAS(s) meet the requirements identified above (refer to template in (d) below); and

(B) Details of the system design, test approach, and testing carried out to validate that the RPAS(s) meet the requirements. Note that the design, test approach, and testing should include consideration of the effects of the following probable failures:

(I) Intermittent or degraded C2 link particularly at or around vertical obstacles or sources of EMI.

(II) Indications, RPA response and crew procedures / actions in the event of a permanent loss of the C2 link.

(III) Total or partial failure of the remote pilot station affecting such systems as electronic displays, video feeds, internet, manual control interfaces etc. caused by software, hardware or power failures.

(IV) Navigation system failures including degradation or total loss of GPS, IMUs, sensors or cameras that may result in a reduction in navigation accuracy and/or a loss of available navigation modes.

(V) Flight planning failures that could result in a loss of containment (i.e. incorrect setting of waypoints / RTH function).

(iii) Examples of acceptable containment approaches include (note that this is not intended to be an exhaustive list):

(A) Independent kill switch. To support meeting the above containment requirements, the key aspects of a kill switch design are:

(I) Independence. This requires the kill switch to be separate from the other aircraft systems, particularly those systems whose failures can be precursors to flyaways, and including assessment of potential common cause and common mode failure cases.

(II) Reliability. There are a variety of ways to substantiate reliability for such a system, but likely the simplest is to ensure that the system can be tested pre-flight and, ideally, monitored in-flight. Provided that the system is inspected and tested sufficiently regularly, the exposure time to an undetected failure can be reduced such that the reliability requirement is met. Note that using this approach requires that the inspection/testing of the containment system be integrated into the operational procedures at the appropriate locations.

(B) Tethering. A tether could also be used to address the containment requirements described above. Note that the probability of the tether failing to contain the aircraft would need to be shown to be remote. Potential approaches could include either a tether with sufficient strength that the aircraft structure would be compromised prior to tether breakage, or a tether connected to the aircraft power source such that reaching the

limit of the tether guaranteed a disconnection of power and flight termination.

(d) Declaration template:

STSC-002 Technical Declaration

I hereby declare that the RPAS(s) listed below have been developed, constructed, and verified to meet the technical requirements identified in TCCA STSC-002, found in AC 903-001 Appendix D, to operate in the environment(s) identified in the CONOPS of the attached SFOC – RPAS application. The RPAS Flight Manual, the RPAS Maintenance Procedures, the RPAS Logbook, and the processes for design and manufacturing have been made available to the SFOC – RPAS applicant and are available for inspection or retention by the Minister as required.

Make	Model

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

4.0 STSC-003 – Small RPA, VLOS, uncontrolled Airspace above 400 ft AGL

(1) **Introduction.** For this standard scenario, TCCA has undertaken an RPAS ORA assessment for a predefined CONOPS involving VLOS operation of a small RPA having an operating weight of more than 250 g up to 25 kg in uncontrolled airspace above 400 ft AGL. This standard scenario has not been endorsed by JARUS and is applicable to operations as described in Canadian airspace only.

(2) **Scope.** This standard scenario is intended to be used as part of the application process for an SFOC – RPAS approval. The permissible operational limitations under this scenario are:

(a) Small RPA having an operating weight of more than 250 g up to 25 kg.

(b) Ground area: Anywhere in Canada, with limitations on distances from another person as per CAR Part 901 based on the Standard 922 declaration status of the RPA.

(c) Altitude: Limited by the ability for the RPA to remain VLOS, to a maximum that allows the RPA to descend below 400 ft AGL or move into Atypical Airspace (ref. AC 903-001 2.3(1)(c)) in one minute or less.

(d) Airspace: Uncontrolled airspace, a minimum[12] of 2 nautical miles horizontally and 500 ft vertically from any controlled airspace. No limitations on distance from airports, heliports, or aerodromes.

(3) **Application.** The following sections provide applicants with guidance about the minimum information and evidence required to support an application for operations according to the standard scenario STSC-003. TCCA considers these the minimum requirements for applications under this scenario, and applicants should assess whether higher levels of safety are required based on the complexity of the operation. At minimum, applicants must complete SFOC-RPAS Application Form 26-0835 and associated compliance checklist with all required information and provide attachment(s) with the supporting information described below. More information on SFOC-RPAS application and Compliance Checklist are available from our website.

(4) **Supporting Information.** The following sections provide guidance about the minimum additional supporting information required to demonstrate that an applicant is capable of operating safely within the environment described in this standard scenario. Based on the scope described above, this standard scenario is assigned a SAIL of II and the supporting information is based on requirements at that level. Note that the location of the supporting information / evidence for each of the following points should be identified specifically in the application for this standard scenario.

(a) Operational Considerations. The following table describes the necessary supporting information related to operational considerations (crew qualifications, training, etc.).

[12] Note that these values are minimums, and may be adjusted upwards on a case-by-case basis if aircraft performance and/or emergency procedures dictate that greater values are required. Also note that no buffer distance is necessary if the operation has permission from the local ANSP to operate in the adjacent controlled airspace.

Topic (SORA OSO #)	Information Required	Guidance
Operator Competency (1)	• Company Operations Manual • Advanced sRPA Pilot Certificates	Note that a document titled "Company Operations Manual" is not specifically required. What is necessary is documentation to demonstrate that operations are conducted in a consistent and standardized manner, along with a process for identifying and addressing any issues identified. Also note that draft documentation could be considered acceptable for this scenario.
Maintenance (3)	• Maintenance Program / Schedule for applicable RPAS(s)	
Pre-Flight Inspection (7)	• Documented Pre-Flight procedure • Evidence that any pre-flight checks required to address Containment requirements as detailed in (c), below, are included	
Operational Procedures (8, 11, 14, 21)	• Evidence that operational procedures have been reviewed, practiced, and updated where required.	
Crew Training (9, 15, 22)	• Declaration that all crew members have been trained on the topics identified in Appendix C, Section 1.1(3)(a)(ix)(A).	Refer to operational declaration template under item (d), below.
Multi-crew coordination (16)	• Operational Procedures related to crew coordination and communications (can be a reference to a section of the Company Operations Manual).	
Crew Fitness (17)	• Declaration that a crew fitness policy is in place • Crew self-declarations of fitness prior to flight	Refer to operational declaration template under item (d), below.
Adherence to RPAS environmental limits (23)	• Declaration that the environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).	Refer to operational declaration template under item (d), below.

(b) Technical Considerations. The following table describes the necessary supporting information related to technical considerations (RPA design, systems performance, etc.).

Topic (SORA OSO #)	Information Required	Guidance
Manufacturer Competency (2)	• N/A	
RPAS Design Standards (4)	• N/A, but refer to Containment requirements as detailed in (c), below.	

Topic (SORA OSO #)	Information Required	Guidance
RPAS Reliability (5, 12)	• N/A, but refer to Containment requirements as detailed in (c), below.	
C2 Link (6)	• Details of signal strength monitoring and alerting • Evidence of site survey and/or pre-flight assessment plan for local conditions affecting C2 (e.g., terrain, obstacles, EMI sources, etc.)	
Recovery from technical issues (10) and human error (19)	• N/A, but refer to Containment requirements as detailed in (c), below.	
Adequacy of external systems (13)	• Declaration that any external systems or services in use are adequate for the operation.	Refer to operational declaration template under item (d), below.
Flight Envelope Protection (18)	• N/A, but refer to Containment requirements as detailed in (c), below.	
Human Factors evaluation (20)	• Declaration that the RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.	Refer to technical declaration template under item (d), below. An RPAS that is declared to meet the requirements for “Near People” or “Over People” operations under CAR Standard 922 (922.05 or 922.06 respectively) is considered to meet this requirement and no further declaration is necessary.
RPAS environmental design (24)	• N/A	

(c) Containment Considerations. To ensure safety in the case of failure scenarios that could lead to a flyaway, applicants must demonstrate a robust containment solution for their RPA.

(i) The top level requirements that must be met by this system are (sourced from Section 9.4):

(A) No single failure of the RPAS or any external system supporting the operation shall result in operation outside of the operational volume.

(B) Any failure of a system or subsystem whose operation is required to meet 5.0(4)(d)(i)(A) shall be detectable by the operator.

(ii) The supporting information that must be provided to substantiate that the RPAS(s) meets the requirement is a declaration that the RPAS(s) meet the requirements identified above (see template in (d), below). An RPAS that is declared to meet the requirements for “Near People” or “Over People” operations under CAR Standard 922 (922.05 or 922.06 respectively) is considered to meet this requirement and no further declaration is necessary.

(A) Note that the design, test approach, and testing should include consideration of the effects of the following probable failures:

(I) Intermittent or degraded C2 link particularly at or around vertical obstacles or sources of EMI.

(II) Indications, RPA response and crew procedures / actions in the event of a permanent loss of the C2 link.

(III) Total or partial failure of the remote pilot station affecting such systems as electronic displays, video feeds, internet, manual control interfaces etc. caused by software, hardware or power failures.

(IV) Navigation system failures including degradation or total loss of GPS, IMUs, sensors or cameras that may result in a reduction in navigation accuracy and/or a loss of available navigation modes.

(V) Flight planning failures that could result in a loss of containment (i.e. incorrect setting of waypoints / RTH function).

(iii) Examples of potentially acceptable containment approaches include (note that this is not intended to be an exhaustive list):

(A) Geofencing.

(B) Flight termination systems, e.g.:

(I) Software-based return-to-home or autoland functions.

(II) Remote kill switches.

(C) Tethering, either mechanically or as a power source disconnect.

(D) Energy limits (i.e., only carrying sufficient fuel load / battery charge / etc. to reach the edge of the operational volume in a flyaway situation).

(d) Declaration templates:

STSC-003 Operational Declaration

I hereby declare that, for the operation described in the attached application package:

- All RPAS crew members have been trained on the topics identified in AC 903-001 Appendix C, Section 1.1(3)(a)(ix)(A).
- A crew fitness policy is in place, and each RPAS crew member self-declares their fitness prior to acting as a member of the flight crew.
- Any external systems or services in use are adequate for the operation.
- The environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

STSC-003 Technical Declaration

I hereby declare that the RPAS(s) listed below have been developed, constructed, and verified to meet the following technical requirement:

- The RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.
- No single failure of the RPAS or any external system supporting the operation will lead to operation outside of the operational volume.
- Any failure of a system or subsystem whose operation is required to meet the above requirement is detectable by the operator.

Make	Model

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

5.0 STSC-004 – Small RPA, BVLOS, Low Risk Ground Areas and Low Risk Airspace using Visual Observer DAA

(1) **Introduction.** For this standard scenario, TCCA has undertaken an RPAS ORA assessment for a predefined CONOPS involving BVLOS operation of a small RPA having an operating weight of more than 250 g up to 25 kg over low risk ground areas in low risk airspace, with Visual Observer DAA used as the primary air risk mitigation (as described in Appendix B Section 3.0). This standard scenario has not been endorsed by JARUS and is applicable to operations as described in Canadian airspace only.

(2) **Scope.** This standard scenario is intended to be used as part of the application process for an SFOC – RPAS approval. The permissible operational limitations under this scenario are:

(a) Small RPA having an operating weight of more than 250 g up to 25 kg, declared for "Controlled Airspace" operations under CAR Standard 922 (922.04).

(b) Ground area:

(i) Must be a minimum[13] of 2 nautical miles outside of any area with a population density greater than 25 ppl/km^2; and

(ii) Must be a minimum of 1 km outside of any area with a population density greater than 5 ppl/km^2.

(c) Altitude: No greater than 400 ft AGL.

(d) Airspace can be either:

(i) Uncontrolled airspace, a minimum of 5 nautical miles from the centre of an aerodrome airport or heliport published in the Canada Flight Supplement or Water Aerodrome Supplement AND a minimum[13] of 2 nautical miles horizontally and 1500 ft vertically from any controlled airspace; or

(ii) Class F restricted airspace with permission from the User/Controlling agency.

(3) **Application.** The following sections provide applicants with guidance about the minimum information and evidence required to support an application for operations according to the standard scenario STSC-004. TCCA considers these the minimum requirements for applications under this scenario, and applicants should assess whether higher levels of safety are required based on the complexity of the operation. At minimum, applicants must complete SFOC-RPAS Application Form 26-0835 and associated compliance checklist with all required information and provide attachment(s) with the supporting information described below. More information on SFOC-RPAS application and Compliance Checklist are available from our website.

(4) **Supporting Information.** The following sections provide guidance about the minimum additional supporting information required to demonstrate that an applicant is capable of operating safely within the environment described in this standard scenario. Based on the scope described above, this standard scenario is assigned a SAIL of II and the supporting information is based on requirements at that level. Note that the location of the supporting information / evidence for each of the following points should be identified specifically in the application for this standard scenario.

(a) Operational Considerations. The following table describes the necessary supporting information related to operational considerations (crew qualifications, training, etc.).

[13] Note that these values are minimums, and may be adjusted upwards on a case-by-case basis if aircraft performance and/or emergency procedures dictate that greater values are required.

Topic (SORA OSO #)	Information Required	Guidance
Operator Competency (1)	• Company Operations Manual • Advanced sRPA Pilot Certificates	Note that a document titled "Company Operations Manual" is not specifically required. What is necessary is documentation to demonstrate that operations are conducted in a consistent and standardized manner, along with a process for identifying and addressing any issues identified. Also note that draft documentation could be considered acceptable for this scenario.
Maintenance (3)	• Maintenance Program / Schedule for applicable RPAS(s)	
Pre-Flight Inspection (7)	• Documented Pre-Flight procedure • Evidence that any pre-flight checks required to address Containment requirements as detailed in (d), below, are included	
Operational Procedures (8, 11, 14, 21)	• Evidence that operational procedures have been reviewed, practiced, and updated where required.	Refer to Appendix G, Section 2.0 for guidance on addressing the population density criteria of this standard scenario. Note that a sample site survey for at least one operational location should be provided as part of the application.
Crew Training (9, 15, 22)	• Declaration that all crew members have been trained on the topics identified in Appendix C, Section 1.1(3)(a)(ix)(A).	Refer to operational declaration template under item (e), below.
Multi-crew coordination (16)	• Operational Procedures related to crew coordination and communications (can be a reference to a section of the Company Operations Manual).	
Crew Fitness (17)	• Declaration that a crew fitness policy is in place • Crew self-declarations of fitness prior to flight	Refer to operational declaration template under item (e), below.
Adherence to RPAS environmental limits (23)	• Declaration that the environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).	Refer to operational declaration template under item (e), below. Note that since the primary safety system in this STSC is the containment system described in in (d), below, this declaration can be interpreted as applying to the containment system only (i.e., the environmental limits in use for the proposed operation will ensure that the containment system functions as intended).

(b) Detect and Avoid Considerations. The following table describes the necessary supporting information related to Detect and Avoid using the Visual Observer DAA guidance material described in Appendix B, Section 3.0.

Topic (Appendix B Section 3.0 Paragraph)	Information Required	Guidance
(3) (a) and (b)	• None since these conditions are addressed by the scope of this STSC.	
(3) (c) and (d)	• Operational procedure(s) showing how to plan the location(s) of the pilot and VO(s) with reference to the operational flight location(s).	
(3) (e)	• Evidence of C2 link demonstration at a distance at least double the maximum planned operational distance.	
(3) (f)	• Evidence of operational procedure showing how visibility and ceilings will be assessed at operational location(s), with pre-flight GO/NO-GO criteria established.	
(3) (g)	• Evidence of consideration for visual observer sightlines during operational planning, plus evidence of on-site pre-flight assessment of visibility.	
(3) (h)	• Evidence of consideration for sun position during operational planning, plus evidence of on-site pre-flight assessment of sun location.	
(3) (i)	• Evidence of consideration for visual observer noise environment during operational planning, plus evidence of on-site pre-flight assessment of noise.	
(4) (a) (i)	• RPAS Make & Model must be declared for “Controlled Airspace” under CAR Standard 922.	
(4) (a) (ii)	• Specifications of the installed anti-collision lighting to address (A) through (D), plus operational procedures to address (E).	
(4) (a) (iii) and (iv)	• Specifications of C2 link performance and link quality monitoring, and operational procedures showing approach to maintaining quality at or above 50%.	
(4) (b) (i)	• Specifications of Aviation-band VHF radio(s) intended for use in the operation.	
(4) (b) (ii)	• Details of the means of communication between the remote pilot and the visual observer(s).	

Topic (Appendix B Section 3.0 Paragraph)	Information Required	Guidance
(5) (a)	• Evidence of qualifications as specified.	Note that the specified ground school is NOT required to be "in-person".
(5) (b)	• Evidence of qualifications as specified.	
(5) (c)	• Evidence of qualifications as specified.	
(6)	• Reference to the section of the operational procedures that addresses each of the identified items.	

(c) Technical Considerations. The following table describes the necessary supporting information related to technical considerations (RPA design, systems performance, etc.).

Topic (SORA OSO #)	Information Required	Guidance
Manufacturer Competency (2)	• N/A	
RPAS Design Standards (4)	• N/A, but refer to Containment requirements as detailed in (d), below.	
RPAS Reliability (5, 12)	• N/A, but refer to Containment requirements as detailed in (d), below.	
C2 Link (6)	• Details of signal strength monitoring and alerting • Evidence of site survey and/or pre-flight assessment plan for local conditions affecting C2 (e.g., terrain, obstacles, EMI sources, etc.)	
Recovery from technical issues (10) and human error (19)	• N/A, but refer to Containment requirements as detailed in (d), below.	
Adequacy of external systems (13)	• Declaration that any external systems or services in use are adequate for the operation.	Refer to operational declaration template under item (e), below.
Flight Envelope Protection (18)	• N/A, but refer to Containment requirements as detailed in (d), below.	
Human Factors evaluation (20)	• Declaration that the RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.	Refer to technical declaration template under item (e), below. An RPAS that is declared to meet the requirements for "Near People" or "Over People" operations under CAR Standard 922 (922.05 or 922.06 respectively) is considered to meet this requirement and no further declaration is necessary.
RPAS environmental design (24)	• N/A	

(d) Containment Considerations. To ensure safety in the case of failure scenarios that could lead to a flyaway, applicants must demonstrate a robust containment solution for their RPA.

(i) The top level requirements that must be met by this system are (sourced from Section 9.4):

(A) No single failure of the RPAS or any external system supporting the operation shall result in operation outside of the operational volume.

(B) Any failure of a system or subsystem whose operation is required to meet (A) shall be detectable by the operator.

(ii) The supporting information that must be provided to substantiate that the RPAS(s) meets the requirement is a declaration that the RPAS(s) meet the requirements identified above (see template in (e), below). An RPAS that is declared to meet the requirements for “Near People” or “Over People” operations under CAR Standard 922 (922.05 or 922.06 respectively) is considered to meet this requirement and no further declaration is necessary.

(A) Note that the design, test approach, and testing should include consideration of the effects of the following probable failures:

(I) Intermittent or degraded C2 link particularly at or around vertical obstacles or sources of EMI.

(II) Indications, RPA response and crew procedures / actions in the event of a permanent loss of the C2 link.

(III) Total or partial failure of the remote pilot station affecting such systems as electronic displays, video feeds, internet, manual control interfaces etc. caused by software, hardware or power failures.

(IV) Navigation system failures including degradation or total loss of GPS, IMUs, sensors or cameras that may result in a reduction in navigation accuracy and/or a loss of available navigation modes.

(V) Flight planning failures that could result in a loss of containment (i.e. incorrect setting of waypoints / RTH function).

(iii) Examples of potentially acceptable containment approaches include (note that this is not intended to be an exhaustive list):

(A) Geofencing.

(B) Flight termination systems, e.g.:

(I) Software-based return-to-home or autoland functions.

(II) Remote kill switches.

(C) Tethering, either mechanically or as a power source disconnect.

(D) Energy limits (i.e., only carrying sufficient fuel load / battery charge / etc. to reach the edge of the operational volume in a flyaway situation).

(e) Declaration templates:

STSC-004 Operational Declaration

I hereby declare that, for the operation described in the attached application package:

- All RPAS crew members have been trained on the topics identified in AC 903-001 Appendix C, Section 1.1(3)(a)(ix)(A).
- A crew fitness policy is in place, and each RPAS crew member self-declares their fitness prior to acting as a member of the flight crew.
- Any external systems or services in use are adequate for the operation.
- The environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

STSC-004 Technical Declaration

I hereby declare that the RPAS(s) listed below have been developed, constructed, and verified to meet the following technical requirement:

- The RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.
- No single failure of the RPAS or any external system supporting the operation will lead to operation outside of the operational volume.
- Any failure of a system or subsystem whose operation is required to meet the above requirement is detectable by the operator.

Make	Model

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

6.0 STSC-005 – 25 - 150 kg RPA, VLOS, Controlled Ground, Uncontrolled Airspace

(1) **Introduction.** For this standard scenario, TCCA has undertaken an RPAS ORA assessment for a predefined CONOPS involving VLOS operation of RPA having an operating weight of more than 25 kg up to 150 kg over controlled ground areas in uncontrolled airspace. While not an exhaustive list, the use cases that may be addressed by this scenario include filmmaking operations, precision agriculture support, remote sensing applications with payloads requiring larger RPA, and operation of model aircraft larger than 25 kg. This standard scenario has not been endorsed by JARUS and is applicable to operations as described in Canadian airspace only.

(2) **Scope.** This standard scenario is intended to be used as part of the application process for an SFOC – RPAS approval. The permissible operational limitations under this scenario are:

(a) RPA: having an operating weight of more than 25 kg up to 150 kg.

(b) Ground area: Must be controlled (ref. AC 903-001 2.3(1)(h)) underneath the entire flight area (i.e., the flight geography per 2.3(1)(k) plus the contingency volume per 2.3(1)(g)), plus a buffer area extending beyond the flight area by 100 feet plus the proposed operational altitude in feet AGL (e.g., if the proposed operational altitude is 100 ft AGL, the controlled buffer area beyond the flight area must be 200 ft laterally).

(i) Note that a controlled ground area is not required in areas or directions where uninvolved persons are sheltered by obstacles that would likely not be penetrated by the RPA at maximum speed (e.g., buildings). The default assumption in this standard scenario is that cars, structures, buildings, etc. **do not** provide shelter, but sheltering can be used if an analysis of RPA kinematics and the sheltering object strength show that sufficient safety is provided.

(ii) Note that operational procedures must also dictate that kinetic energy never be directed towards uninvolved and unsheltered persons less than 500 ft from the RPA. The intent of this requirement is to ensure that the detailed planning of the operation within the operational volume ensures that the flight path and turnaround areas of the RPA are arranged such that in the event of a failure, uninvolved people are protected.

(c) Altitude: No greater than 400 ft AGL. Note that lower altitudes reduce the size of the controlled ground area as per above.

(d) Airspace: Uncontrolled airspace, or Class F restricted airspace with permission from the User/Controlling agency.

(3) **Application.** The following sections provide applicants with guidance about the minimum information and evidence required to support an application for operations according to the standard scenario STSC-005. TCCA considers these the minimum requirements for applications under this scenario, and applicants should assess whether higher levels of safety are required based on the complexity of the operation. At minimum, applicants must complete SFOC-RPAS Application Form 26-0835 and associated compliance checklist with all required information and provide attachment(s) with the supporting information described below. More information on SFOC-RPAS application and Compliance Checklist are available from our website.

(4) **Supporting Information.** The following sections provide guidance about the minimum additional supporting information required to demonstrate that an applicant is capable of operating safely within the environment described in this standard scenario. Based on the scope described above, this standard scenario is assigned a SAIL of II and the supporting information is based on requirements at that level. Note that the location of the supporting information / evidence for each of the following points should be identified specifically in the application for this standard scenario.

(a) Operational Considerations. The following table describes the necessary supporting information related to operational considerations (crew qualifications, training, etc.).

Topic (SORA OSO #)	Information Required	Guidance
Operator Competency (1)	• Company Operations Manual • Advanced sRPA Pilot Certificates	Note that a document titled "Company Operations Manual" is not specifically required. What is necessary is documentation to demonstrate that operations are conducted in a consistent and standardized manner, along with a process for identifying and addressing any issues identified. Also note that draft documentation could be considered acceptable for this scenario.
Maintenance (3)	• Maintenance Program / Schedule for applicable RPAS(s)	
Pre-Flight Inspection (7)	• Documented Pre-Flight procedure • Evidence that any pre-flight checks required to address Containment requirements as detailed in (c), below, are included	
Operational Procedures (8, 11, 14, 21)	• Evidence that operational procedures have been reviewed, practiced, and updated where required.	
Crew Training (9, 15, 22)	• Declaration that all crew members have been trained on the topics identified in Appendix C, Section 1.1(3)(a)(ix)(A).	Refer to operational declaration template under item (d), below.
Multi-crew coordination (16)	• Operational Procedures related to crew coordination and communications (can be a reference to a section of the Company Operations Manual).	
Crew Fitness (17)	• Declaration that a crew fitness policy is in place • Crew self-declarations of fitness prior to flight	Refer to operational declaration template under item (d), below.
Adherence to RPAS environmental limits (23)	• Declaration that the environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).	Refer to operational declaration template under item (d), below. Note that since the primary safety system in this STSC is the containment system described in (c), below, this declaration can be interpreted as applying to the containment system only (i.e., the environmental limits in use for the proposed operation will ensure that the containment system functions as intended).

(b) Technical Considerations. The following table describes the necessary supporting information related to technical considerations (RPA design, systems performance, etc.).

Topic (SORA OSO #)	Information Required	Guidance
Manufacturer Competency (2)	• N/A	
RPAS Design Standards (4)	• N/A, but refer to Containment requirements as detailed in (c), below.	
RPAS Reliability (5, 12)	• N/A, but refer to Containment requirements as detailed in (c), below.	
C2 Link (6)	• Details of signal strength monitoring and alerting • Evidence of site survey and/or pre-flight assessment plan for local conditions affecting C2 (e.g., terrain, obstacles, EMI sources, etc.)	
Recovery from technical issues (10) and human error (19)	• N/A, but refer to Containment requirements as detailed in (c), below.	
Adequacy of external systems (13)	• Declaration that any external systems or services in use are adequate for the operation.	Refer to operational declaration template under item (d), below.
Flight Envelope Protection (18)	• N/A, but refer to Containment requirements as detailed in (c), below.	
Human Factors evaluation (20)	• Declaration that the RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.	Refer to technical declaration template under item (d), below.
RPAS environmental design (24)	• N/A	

(c) Containment Considerations. To ensure safety in the case of failure scenarios that could lead to a flyaway, applicants must demonstrate a highly robust containment solution for their RPA.

(i) The top level requirements that must be met by this system are (sourced from Section 9.5):

(A) No single failure of the RPAS or any external system supporting the operation shall result in operation outside of the operational volume.

(B) The probability that the RPA leaves the operational volume due to any combination of failures of the RPAS and/or any external system supporting the operation shall be shown to be extremely remote.

Note: Quantitative probability values associated with "extremely remote" failure conditions referenced here are intended to be scaled with the kinetic energy of the RPAS as described in Appendix E.

(C) Any failure of a system or subsystem whose operation is required to meet (A) or (B) shall be detectable by the operator.

(D) Software (SW) and Airborne Electronic Hardware (AEH) whose development error(s) could directly lead to operations outside of the operational volume shall be developed to an industry standard or methodology recognized by TCCA (ref. AC 922-001 Appendix A).

(ii) The supporting information that must be provided to substantiate that the RPAS meets the requirements is:

(A) A declaration that the RPAS(s) meet the requirements identified above (refer to template in (d) below); and

(B) Details of the system design, test approach, and testing carried out to validate that the RPAS(s) meet the requirements. Note that the design, test approach, and testing should include consideration of the effects of the following probable failures:

(I) Intermittent or degraded C2 link particularly at or around vertical obstacles or sources of EMI.

(II) Indications, RPA response and crew procedures / actions in the event of a permanent loss of the C2 link.

(III) Total or partial failure of the remote pilot station affecting such systems as electronic displays, video feeds, internet, manual control interfaces etc. caused by software, hardware or power failures.

(IV) Navigation system failures including degradation or total loss of GPS, IMUs, sensors or cameras that may result in a reduction in navigation accuracy and/or a loss of available navigation modes.

(V) Flight planning failures that could result in a loss of containment (i.e. incorrect setting of waypoints / RTH function).

(iii) Examples of acceptable containment approaches include (note that this is not intended to be an exhaustive list):

(A) Independent kill switch. To support meeting the above containment requirements, the key aspects of a kill switch design are:

(I) Independence. This requires the kill switch to be separate from the other aircraft systems, particularly those systems whose failures can be precursors to flyaways, and including assessment of potential common cause and common mode failure cases.

(II) Reliability. There are a variety of ways to substantiate reliability for such a system, but likely the simplest is to ensure that the system can be tested pre-flight and, ideally, monitored in-flight. Provided that the system is inspected and tested sufficiently regularly, the exposure time to an undetected failure can be reduced such that the reliability requirement is met. Note that using this approach requires that the inspection/testing of the containment system be integrated into the operational procedures at the appropriate locations.

(B) Tethering. A tether could also be used to address the containment requirements described above. Note that the probability of the tether failing to contain the aircraft would need to be shown to be remote. Potential approaches could include either a tether with sufficient strength that the aircraft structure would be compromised prior to tether breakage, or a tether connected to the aircraft power source such that reaching the limit of the tether guaranteed a disconnection of power and flight termination.

(d) Declaration templates:

STSC-005 Operational Declaration

I hereby declare that, for the operation described in the attached application package:

- All RPAS crew members have been trained on the topics identified in AC 903-001 Appendix C, Section 1.1(3)(a)(ix)(A).
- A crew fitness policy is in place, and each RPAS crew member self-declares their fitness prior to acting as a member of the flight crew.
- Any external systems or services in use are adequate for the operation.
- The environmental limits in use for the proposed operation are adequate to ensure safe operation of the RPAS(s).

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature:

STSC-005 Technical Declaration

I hereby declare that the RPAS(s) listed below have been developed, constructed, and verified to meet the following technical requirement:

- No single failure of the RPAS or any external system supporting the operation will lead to operation outside of the operational volume.
- The probability that the RPA leaves the operational volume due to any combination of failures of the RPAS and/or any external system supporting the operation shall be shown to be extremely remote.
- Any failure of a system or subsystem whose operation is required to meet the above requirements is detectable by the operator.
- Software (SW) and Airborne Electronic Hardware (AEH) whose development error(s) could directly lead to operations outside of the operational volume shall be developed to an industry standard or methodology recognized by TCCA (ref. AC 922-001 Appendix A).
- The RPAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to RPAS crew error that could adversely affect the safety of the operation.

Make	Model

Name of Responsible Person:

Title of Signatory:

Email Address:

Signature: