



香港特別行政區政府  
民航處  
Civil Aviation Department  
The Government of the Hong Kong Special Administrative Region

**Small Unmanned Aircraft Advisory Circular  
No. AC-004**

Date: 31 May 2022

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**Permission for Small Unmanned Aircraft  
Extended Visual Line of Sight Operations**

**1. Background**

- 1.1 The Small Unmanned Aircraft Order (“SUA Order”), Chapter 448G of the Laws of Hong Kong, comes into operation on 1 June 2022. Under the SUA Order, small unmanned aircraft (“SUA”) operations are regulated under a risk-based approach and be classified according to the weight of the SUA and the operational risk level.
- 1.2 Section 15 of the SUA Order stipulates that an SUA must be operated in compliance with all operating requirements applicable to the aircraft at all times during the flight, unless the SUA is operated for the flight in accordance with a permission granted by the Director-General of Civil Aviation under section 37 of the SUA Order.
- 1.3 This Advisory Circular (“AC”) sets out the requirements for permission to operate an SUA in circumstances where the following operating requirement under the SUA Order cannot be met :-
- A visual line of sight is maintained with the aircraft in a specified way [*section 16(1)(b)<sup>1</sup>*]
- by means of operating an SUA in **Extended Visual Line of Sight** (“EVLOS”).

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<sup>1</sup> The way in which a visual line of sight is to be maintained is specified in the Gazette Notice issued under section 17(2) of the SUA Order.

## 2. Definition

- 2.1 A **visual line of sight** (“VLOS”) is direct and unaided (other than by way of corrective lenses and sunglasses) visual contact with the SUA and the surrounding airspace in which the SUA is operating. VLOS can be maintained by :
- a) the remote pilot of the SUA, and/or
  - b) a visual observer (“VO”), chosen by the remote pilot, who is **at the same location as the remote pilot**, has good eyesight and is capable of communicating timely and effectively with the remote pilot of the SUA to avoid collision.
- 2.2 To ensure aviation and public safety, remote pilot of SUA should endeavour to operate in compliance with all operating requirements applicable to the SUA as specified under section 15 of the SUA Order at all times during the flight. On the other, the Civil Aviation Department (“CAD”) notes that there are SUA practical uses and operational circumstances where the stipulated operating requirements, such as the VLOS requirement, may not be met. In special circumstances where the VLOS requirement cannot be met, the SUA may be required to operate in EVLOS.
- 2.3 With the assistance of a VO, **an SUA may be operated within EVLOS** in which VLOS is maintained by:
- (i) the remote pilot of the SUA, and/or
  - (ii) a VO, chosen by the remote pilot, who is **at a different location from the remote pilot**, has good eyesight, and is capable of communicating timely and effectively with the remote pilot of the SUA to avoid collision.
- 2.4 EVLOS operations are not routinely permitted. Operators are required to conduct safety risk assessment and mitigation strategy prior to any application for permission to operate in EVLOS.

## 3. Applicability

- 3.1 During EVLOS operation, the remote pilot and/ or the chosen VO shall be able to clearly see the SUA and the surrounding airspace while it is airborne, such that the remote pilot is able to monitor the aircraft’s flight path and so manoeuvre it clear of anything that it might collide with.
- 3.2 The remote pilot of the SUA has the ultimate responsibility to ensure collision avoidance and operation in a safe airspace during the EVLOS flight.

#### **4. Personnel Requirements**

- 4.1 The remote pilot for the flight shall hold a valid remote pilot certificate and be assigned with an Advanced Rating.
- 4.2 The remote pilot shall choose a VO whom the remote pilot is satisfied that the VO is competent for the EVLOS operations to be conducted. The VO is required to complete satisfactorily internal training and assessment relevant to the duties and responsibilities and maintain currency. The records of relevant training shall be maintained and made available upon CAD's request.

#### **5. Operating Requirements**

- 5.1 The remote pilot shall be satisfied that the airspace in which the operation will take place will be visible at all times by the remote pilot and/or the chosen VO during the flight.
- 5.2 During EVLOS operation, the remote pilot shall maintain direct and effective communication with the VO to continuously know and determine the position, altitude, attitude (orientation, deck angle, pitch, bank) and movement of his/ her SUA, as well as the collision avoidance information for safe operation of the SUA.
- 5.3 During EVLOS operation, the VO shall not maintain VLOS with more than one SUA or for more than one remote pilot at any one time. They should not be assigned other duties.
- 5.4 The SUA shall not be operated within a restricted flying zone or carry any dangerous goods during flight, unless a relevant permission has been separately obtained.
- 5.5 The remote pilot shall comply with all other applicable operating requirements to the SUA, i.e. operating the SUA only in daylight hours, maintaining the flying altitude at 300 ft Above Ground Level or below, maintaining lateral separation with any uninvolved person and vehicle, vessel or structure not under the control of the remote pilot according to the speed of the aircraft, not carrying any person or animal during flight, nothing being dropped from the aircraft, the remote pilot operating no more than one SUA at the same time and the dimension of SUA not exceeding 1m during flight (except that longest distance between any two rotor blade tips can be up to 1.2 m). More information about the requirements is available in the Safety Requirements Document ("SRD") published by the CAD.

5.6 Applications may be made for any one or more than one specific type of advanced operations; but in any one flight, only one type of advanced operations should be involved, unless otherwise specified by the CAD in the permission concerned.

## 6. Others

6.1 The remote pilot, responsible person of SUA or any other person who knowingly causes or permits the aircraft to be operated for the flight should take note that apart from the SUA Order, other regulations, bylaws, requirements, etc. may also govern the usage of SUA. Applicable rules shall be observed and consent from relevant land or property owner, management, authority or agency shall be obtained if deemed necessary or appropriate for the intended operations.

## 7. Application

7.1 Applicants may apply to the CAD for permission to conduct EVLOS operations following the requirements set out in AC-002.

7.2 Apart from the requirements prescribed in AC-002, an applicant shall also include the following information/ document specific to EVLOS operations as part of the application:

a) An Operations Manual including (See **Appendix A** for details):

- Duties and responsibilities of all crew member(s) including remote pilot and VO;
- Description of the EVLOS operations and the procedures to ensure safe operation;
- General and emergency procedure to conduct the EVLOS operations safely, including flight checks to be carried out and communication protocols between the remote pilot and VO;
- Description of qualifications requirements to ensure competency and currency for all personnel involved in the intended operations, including the VO; and

b) A risk assessment identifying hazards specific to EVLOS operations and the corresponding risk mitigation measures (See **Appendix B** for details)

7.3 Dependent on the risks and complexity of the proposed operation, the CAD may require a flight demonstration to be performed to assess the applicant's capabilities and safety of the proposed operation.

## **8. Enquiries**

- 8.1 This AC will be subject to review and update from time to time in the light of the advancement of technology and increasing popular use of SUA in different professional applications. It should also be noted that the safety requirements provided above are not meant to be exhaustive. It shall be the responsibility of the SUA responsible person and remote pilots to comply with all applicable regulatory requirements, put in place appropriate safety precautions and risk mitigating measures for the subject SUA operation, as well as to follow the requirements and guidelines set out by any property owner and/or manager to ensure the safe operations of SUA at all times.
- 8.2 This AC should be read in conjunction with the SUA Order, SRD and other SUA related documents published by the CAD.
- 8.3 For enquiries, please contact the Unmanned Aircraft Office of the CAD at [sua@cad.gov.hk](mailto:sua@cad.gov.hk).

## **9 Notes**

- 9.1 This AC supersedes the version dated 18 March 2022.

## **Appendix A – Operations Manual for EVLOS Operation**

The applicant may make reference to the sample of Operations Manual and incorporate into the manual specific descriptions/ policies/ procedures applicable to EVLOS operations to address any concerns and issues arose. While the following are not intended to be exhaustive or prescriptive, the applicant should give similar considerations in the Operations Manual.

### **A. Responsibilities and Duties**

- The duties and responsibilities of the Remote Pilot and Visual Observer shall be detailed in the Operations Manual, including but not restricted to:

#### Remote Pilot

- a) Conduct SUA flight in accordance with the procedures set out in the Operations Manual;
- b) Ensure the overall safety of the SUA operation on-site, including collision avoidance and operation in a safe airspace during the flight;
- c) Confirm the Visual Observer maintains currency of his/ her training and is physically fit to carry out duties as a Visual Observer;
- d) Brief and debrief all members of the flight team and associated staff and ensure they are aware of their responsibilities and tasks for the particular SUA operation;
- e) Conduct risk assessment to identify any hazard for the operation and determine risk mitigating measures to be implemented;
- f) Conduct site survey to determine if the prevailing conditions are suitable for SUA operations and complete the associated forms;
- g) Work out the flight details including flight time, flight duration, take-off and landing area, flight path, position of Visual Observer etc. and execute accordingly;
- h) Perform pre-flight check to ensure the SUA is in good condition and functioning properly prior to take-off or launching;
- i) Halt or cancel SUA operation if, at any time, the safety of persons or property on ground or in the air is in jeopardy, or if there is a failure to comply with the provisions of permission issued by the CAD; and
- j) Ensure that all logs and records in relation to the operations are properly completed and signed.

#### Visual Observer

- a) Maintain direct, unaided (other than corrective lenses) visual contact with the SUA to know the SUA location, determine the SUA's attitude, altitude and direction of flight, observe the airspace for other air traffic or hazards and determine if the SUA become a hazard to any other aircraft, person or property;
- b) Communicate continuously and effectively with the Remote Pilot and provide sufficient collision avoidance information to the Remote Pilot; and

- c) Inform the Remote Pilot when the SUA is approaching its maximum operating range limits.

## **B. Qualification Requirements**

- The Visual Observer shall be competent for the EVLOS operations to be conducted. He/ she is required to complete satisfactorily internal training and assessment relevant to the duties and responsibilities and maintain currency by test flights, training flights and/ or actual SUA operations. The training programme for Visual Observer shall be documented in the operations manual.
- All training records shall be properly kept and updated by the SUA Operator, and shall be made available in a legible format to the CAD upon request.

## **C. Communications**

- The Remote Pilot shall consider adequate means of communication between crew members and any other relevant people when conducting operations, including any procedures that need to be implemented. The Remote Pilot should also consider back up communication methods in case the primary means of communication fails.
- Communication protocols between the Remote Pilot and Visual Observer to communicate collision avoidance information and corresponding commands.

## **D. On-site Procedures and Pre-flight Checks**

- Before the operation, the Remote Pilot shall conduct comprehensive flight planning (including daylight reconnaissance and site safety assessment) prior to the operation to ensure compliance with all applicable statutory requirements, e.g. the flight path is so planned that the operation will not be conducted in a congested area and within a restricted flying zone. Any hazards, restrictions and obstacles shall be identified, addressed and recorded.
- The Remote Pilot shall be satisfied that the airspace in which the operation will take place will be visible at all times by the Visual Observer during the flight. An assessment shall be conducted taking into account physical obstacles, meteorological conditions and position of the Visual Observer.

- The Remote Pilot shall brief the all crew members participating in the operation, especially the Visual Observer, to ensure they are fully aware of their responsibilities and the operational task.

## **E. Flight Procedures**

- During EVLOS operation, the Remote Pilot shall, with the assistance from the Visual Observer, continuously know and determine the position, altitude, attitude and movement of his/ her SUA and ensure it remains in the area of intended operation without exceeding the performance capabilities of the command and control link.
- At all times during the flight, the Visual Observer shall maintain VLOS with the SUA to
  - a) know the SUA location;
  - b) Determine the SUA's attitude, altitude and direction of flight;
  - c) Observe the airspace for other air traffic or hazards; and
  - d) Determine if the SUA become a hazard to any other aircraft, person or property.

And maintain continuous and effective communication with the Remote Pilot for avoidance of potential collision hazards and maintaining awareness of the SUA location.

- If the Visual Observer fails to maintain VLOS with the SUA, or the SUA becomes a hazard to any other aircraft, person or property, the Remote Pilot shall immediately respond in accordance with established emergency procedures to ensure the safety of operation. The relevant emergency procedures shall be documented in the operations manual.
- The Visual Observer shall not maintain VLOS with more than one SUA or for more than one Remote Pilot at a time during EVLOS operation. Neither should they be assigned other duties during the flight.

## **F. Emergency Procedures**

- The Remote Pilot shall determine suitable responses and fail-safe mechanism for emergency during operation, e.g. loss of command and control link, and collision avoidance. If the aircraft will return to the 'home' position and land automatically, considerations shall be given to the minimum battery level throughout the flight so that, when such function is activated, the battery level is always sufficient to support a safe landing to the home point. The altitude for such function shall also be deliberated for



obstacle clearance and avoiding collision risk with other aircraft, in any case not above 300 feet AGL.

## Appendix B – Safety Risk Assessment for EVLOS Operation

The applicant shall identify risks specific to the proposed EVLOS operations and propose effective risk mitigation measures so that the risks are mitigated to an acceptable level. A template of risk assessment is available in the sample of Operations Manual. The following is an example of safety risk assessment for EVLOS operations and some anticipated risks to be addressed. Applicant should note that the list is not exhaustive. Any other risks associated with the proposed operation shall be identified and addressed.

<b>Risk No.</b>	<b>Identified Hazard</b>	<b>Associated Risk (What &amp; How)</b>	<b>Existing Mitigation</b>	<b>Current Risk Rating</b>	<b>Further Mitigation</b>	<b>Revised Risk Rating</b>
1.	<i>Loss of sight of the SUA</i>	<i>The SUA cannot be effectively controlled and may collide with other aircraft, person or property</i>	<i>A visual observer is appropriately positioned to maintain VLOS with the SUA</i>	4C	<i>Use of electronic aids (i.e. on-screen or moving map displays) to maintain situational awareness</i>	2C
2.	<i>Poor GPS signal when the SUA is out of remote pilot's VLOS</i>					
3.	<i>Loss of command and control link during flight</i>					
4.	<i>SUA flyaway</i>					
5.	<i>Communication between remote pilot and visual observer fails</i>					

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