UK Civil Aviation Authority

Unmanned Aircraft Operations in an Atypical Air Environment: Policy Concept

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Civil Aviation Authority
Aviation House
Beehive Ring Road
Crawley
West Sussex
RH6 0YR

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Enquiries regarding the content of this publication should be addressed to: uavenquiries@caa.co.uk.

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Revision History

Edition	Date	Summary
First Edition	15 October 2024	Initial Policy Concept Publication
Second Edition	** November 2024	Policy Concept updated the reference to Radio Technical Commission for Aeronautics (RTCA) performance standards RTCA DO-282B.

Abbreviations and Glossary of Terms

The definitive list of abbreviations and terms/definitions that are relevant to Unmanned Aircraft System operations within the UK are centralised within CAP 722D – Master Glossary and Abbreviations.

Atypical Air Environment Policy Concept

This document presents the UK Civil Aviation Authority's (CAA) current position on the requirements applicable to organisations wishing to operate Unmanned Aircraft Systems (UAS) beyond visual line of sight (BVLOS) in an Atypical Air Environment (AAE). As technologies mature and operations commence, our collective understanding will grow which will inform the CAA's work to better enable BVLOS activities in the future. In the meantime, the CAA has developed this policy concept as interim guidance to allow stakeholders to proceed with planning operations in line with the CAA's thinking.

The CAA will continuously review this policy concept to consider technological developments, new evidence from operators and any associated research. This will inform safety monitoring processes and may affect our views and this policy.

An operator who is intending to submit an application to which this policy applies should engage early via bvlos@caa.co.uk to ensure that their application can be properly considered within a timescale that is appropriate for their operation.

Introduction

This innovative policy concept is designed to enable UAS operators to conduct BVLOS operations within an AAE. It is guidance that supports an applicant in deciding what may reasonably be considered an AAE as well as what operational, strategic and technical mitigations might be appropriate for such an operation.

It is not an exhaustive list of what could be deemed an AAE. Similarly, an assessment of the technical, strategic and operational mitigations that may be required will vary from operation to operation.

Operations within an AAE will help us understand how they may scale as well as identify any associated environmental and noise impacts. This policy concept is based on traffic levels today and is subject to review therefore we will work closely with operators who gain an AAE based Operational Authorisation (OA) to maximise information and data sharing opportunities. It will also help manage both the applicant's and the CAA's expectations in an operating environment where AAE activities can evolve safely with appropriate oversight.

The application process to operate within an AAE is initiated through the submission of an Operational Risk Assessment (ORA) in which it must clearly articulate the full extent of the proposed activity. This policy concept is a supporting document to the application process and only considers the air risk specifics of an AAE operation.

At this early stage of policy development, the specific operational volume must be clearly defined within the application. Although there is no specific limit set out in law for the number of operational volumes that may be authorised within one OA, it is likely that separate procedures and safety arguments will be required for each individual volume. As such, it is recommended that UAS operators keep the scope of any atypical application to one site per submission. This will help ensure the management of each application is as efficient as possible. Any applicant for an AAE based OA is advised to engage early with the CAA via bvlos@caa.co.uk prior to submitting their application.

Atypical Air Environment

Operating an Unmanned Aircraft (UA) within an AAE reduces the likelihood of a mid-air collision (MAC) between an UA and other conventionally piloted aircraft. This is particularly useful when operating BVLOS outside of segregated airspace without a detect & avoid (DAA) capability.

There is no single definition for an AAE however, it can be considered as a volume of airspace within which it can be reasonably anticipated that there will be a greatly reduced

number of conventionally piloted aircraft due to the close proximity of specific ground infrastructure.

An AAE is not a separate airspace classification but can exist within any class of airspace. Operations within an AAE must adhere to all rules which apply to UAS within that airspace classification, including any applicable restrictions.

Operating within an AAE does not absolve the UAS operator of having to seek any relevant airspace permissions, such as operations within or near controlled airspace (CAS) or a Restricted Area.

This policy concept is designed to help mitigate the air risks associated with operations within an AAE and does not address ground risks. It is likely that certain elements of ground risk will increase by operating close to infrastructure. Ultimately, it is for the UAS operator to propose how they intend to mitigate other areas of risk in the ORA which the CAA will assess prior to the issuing of an OA. Early engagement with the land or infrastructure owner must take place to ensure necessary safety mitigations are in place and detailed in the ORA.

The following examples of what may be considered an AAE are to be used as a guide.

- Within 100ft of any building or structure.
- Within 50ft of a permanent, above ground level, linear structure. For example, a railway, road, or powerline.
- Within the confines of private property at a height not exceeding 50ft. For example, an industrial site where security personnel use a UA for perimeter inspection.

Given the conceptual nature of this process, an AAE is specific to a geographical location and the infrastructure it is established around. Whilst there is no single definition of what would be routinely accepted as an AAE, applicants will initially be required to define the precise route/Area of Operation (AO) in which they intend to operate, be that a geographical corridor or box. This position may mature as we collectively gain experience of AAE operations.

Note: Some operations, that in concept appear similar, may not be acceptable due to a lack of man-made infrastructure, the proximity to which provides the safety mitigation.

Applicants may propose an alternative example of an AAE; for example, an offshore installation or distances exceeding those suggested above. It is for the UAS operator to explain why they believe the AO can be considered an AAE as well as robustly and coherently describe the mitigations required to reduce residual safety risk to an As Low As Reasonably Practicable and Tolerable level.

Operational Requirements

Within the United Kingdom (UK), through ORS4 1496, the CAA has authorised and permitted certain aerial operations to deviate from the Standardised European Rules of the Air (SERA) minimum height requirements as laid down in UK.SERA.5005(f). Whilst it is reasonable to expect an AAE to have a much reduced encounter rate due to their very close proximity to infrastructure, it is not possible in the UK to guarantee it to be free of conventionally piloted aircraft. Therefore, an AAE is not likely to be sufficient as a MAC mitigation on its own and additional mitigations will usually be required prior to operations being authorised.

Military, emergency services and infrastructure owners[1] all operate aircraft in close proximity to airspace that may be considered an AAE and can land without permission in the course of their tasking. Additionally, the general aviation community may operate from any suitable area of land across the UK, including unlicenced aerodromes, without the need to notify their activity or to be electronically conspicuous.

Given the above activity, as a minimum, the following mitigations are to be considered for all operations within an AAE. If an UAS operator does not believe some or any of them are required for their operation, or that others are more suitable, the ORA must clearly set out why.

Note: These mitigations are regularly employed in crewed aviation and are equally as relevant to UA where their use would be expected to mitigate the MAC collision risk, in a similar way.

Pre-tactical Flight Route Notification

To address the residual MAC risk posed by the UA towards other UA and conventionally piloted aircraft, the operator must pre-notify their intended operating route or AO, and the process to achieve this must be described in the ORA. The type of pre-notification considered appropriate will depend on several factors such as the location and intended duration of the operation. Initially, whilst in the conceptual phase of this policy and unless there is a very good reason not to, submission of a Notice to Aviation (NOTAM) will be considered the default mechanism to satisfy this requirement as it is this process that triggers the CAA's pre-tactical checks. As we learn more, other forms of notification may become more appropriate, such as an Air Information Circular for a regularly used route.

Note: It is not necessary to have the relevant notification approved prior to applying for an OA.

[1] For example, Helicopter Emergency Medical Service (HEMS), National Police Air Service (NPAS) and National Grid.

As is recommended practice with all UA flying, the UAS operator must take all reasonable steps to notify and coordinate their activity with other flying operations that may occur within the AAE. This will vary depending upon the specific geographical location of the intended operation, but must be recorded within pre-flight planning documentation, and would include local HEMS, NPAS, model flying and gliding clubs as well as unlicensed airfields. Additionally, an UAS operator should coordinate their activity with the Military Airspace Management Cell – Low Flying (MAMC LF). Further information about the military low-level flying network can be found here.

Electronic Conspicuity

In December 2022, the Department for Transport (DfT) and CAA published a joint statement detailing their support for the recommended adoption of Automatic Dependent Surveillance-Broadcast (ADS-B) operating on 1090 MHz for piloted aircraft and 978 MHz for UA respectively, utilising existing global standards. The DfT and CAA are currently undertaking a programme of work to deliver this Electronic Conspicuity (EC) specification, aligned to the aims of the Airspace Modernisation Strategy, to support the rapidly evolving needs of new airspace users and to provide additional safety benefits to existing airspace users in Class G airspace in the UK.

To help mitigate the MAC risk between UA and other aircraft operating at very low level in the vicinity of an AAE, an UA operating within an AAE should be equipped with an ADS-B transmitter (single frequency – 978MHz UAT) and receiver (dual frequency – 978MHz and 1090MHz) or transceiver and functioning in accordance with the Radio Technical Commission for Aeronautics (RTCA) performance standards RTCA DO-282B. The CAA and DfT are working with Ofcom to define permanent licensing arrangements for the use of 978 MHz/UAT. In the meantime, operators should utilise OFCOM's Innovation and Trial licensing procedures. An alternative EC solution that services a specific risk may be acceptable on application.

A callsign for the UA shall be allocated and agreed with the CAA. This callsign (together with the allocated hexadecimal aircraft address) will be programmed into the ADS-B device and emitted during flight. The callsign will also be included in any supporting NOTAM in order for other aircraft operators to correlate that operation with the notified activity when detecting the UA electronically. Additionally, the callsign and hexadecimal address of the UA should be made available when coordinating with other airspace users in the pre-flight planning phase.

UAS operators may elect to employ additional mitigations to the MAC risk by utilising received cooperative surveillance emissions (FLARM, PilotAware etc.) either via the receiver/transceiver fitted to the UA or via ground-based reception. In these circumstances, the UAS operator must detail and describe the operating system and associated procedures with the CAA prior to deployment.

Whilst ADS-B provides an increased detection rate it should be noted that it can suffer from body or ground shielding due to the operation's close proximity to the ground and infrastructure.

Further information about EC can be found here.

Safeguarding Operations within Controlled Airspace

AAE BVLOS operations within CAS can add additional complexity and risks and so the UAS operator must co-ordinate with the relevant Air Traffic Control (ATC) service provider prior to conducting an operation and comply with any conditions specified by the ATC unit, such as time restrictions. It is not necessary to have this coordination in place prior to applying for an OA however, the procedure must be described within the ORA.

High Intensity Anti-Collision Lighting

To aid in the visual conspicuity of the UA to other air users, any UA operating within an AAE must be equipped with high intensity anti-collision lighting, which is operating throughout the flight by day or night. The CAA has not currently defined specific technical or operational requirements for high-intensity anti-collision lighting for UA operated within the Specific category however, the Federal Aviation Administration require an upwards facing white strobing light that must be visible from a minimum of three statute miles at night under clear atmospheric conditions with a strobe rate of 40-100 cycles per minute. In the absence of a UK standard, this is considered an appropriate best practice with several products readily available on the market which meet this requirement. Alternatively, it may be appropriate for the UAS operator to make use of aircraft lighting in accordance with SERA.3215.

Containment of the UA within an Atypical Air Environment

Any UA operating within an AAE must be equipped with a technically robust containment solution to ensure a breach of the operational volume is mitigated as far as reasonably practicable. This could be in the form of an onboard software based geo-caging function or, when available, an Unmanned Traffic Management service providers conformance monitoring service.

Collision Avoidance within an Atypical Air Environment

The mitigations within this policy concept render the likelihood of a confliction with a conventionally piloted aircraft unlikely. However, in such circumstances the remote pilot (RP) must take all appropriate action to avoid the confliction. This may be more difficult to achieve when operating BVLOS however, if the RP does become aware of another aircraft in the vicinity of their BVLOS UA they must still make every effort to minimise collision risk.

Assimilated Regulation (EU) 2019/947 sets out in UAS.SPEC.060(3)(b) that;

'…the RP shall: … avoid the risk of collision with any manned aircraft and discontinue the flight when continuing it may pose a risk to other aircraft…'.

Part of meeting this requirement, is the following of the procedures set out by the UAS operator, which are based on the mitigations in this policy concept.

Summary

The recognition and adoption of an AAE within the UK is an innovative concept for the CAA as well as airspace users who will operate in or around them. This AAE policy concept is intended to enable UAS BVLOS operations by exploiting defined airspace environments that offer the potential for a reduced MAC risk due to their close proximity to ground infrastructure. It will help applicants, and the CAA, determine what is acceptable as an AAE and what operational, strategic, and technical mitigations may be necessary to operate within it. It is not a single solution for all UAS operations and is specific to helping address the air risk component of an AAE application only. This policy will evolve as our understanding of how AAEs are used matures. The CAA will closely monitor their use and liaise with successful applicants, adapting and implementing any changes as required.

The guidance contained within this publication is to be read in conjunction with all other OA application, Regulation, Acceptable Means of Compliance and Guidance Material that may be relevant to UAS operations.