Ministry of Defence

ACP-2021-078

Enabling Remotely Piloted Aircraft Operations from RAF Fairford

Stage 3 – Consultation Document

Contents

Glossary of Terms

ADS-B	Automatic Dependent Surveillance - Broadcast
ACP	Airspace Change Proposal
AGL	Above Ground Level
AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
ATC	Air Traffic Control
ATZ	Aerodrome Traffic Zone
BVLOS	Beyond Visual Line of Sight
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
CTA	Control Area
CTR	Control Zone
DA	Danger Area
DAA	Detect and Avoid
DACS	Danger Area Crossing Service
DAAIS	Danger Area Activity Information Service
DP	Design Principle
FBZ	Flight Plan Buffer Zone
FL	Flight Level
FUA	Flexible Use of Airspace
GA	General Aviation (gliders, light aircraft, private helicopters)
GCS	Ground Control Station
HALE	High Altitude Long Endurance
HEMS	Helicopter Emergency Medical Services
LRE	Launch and Recovery Element
LARS	Lower Airspace Radar Service
NATS	National Air Traffic Services
MAA	Military Aviation Authority
MATZ	Military Air Traffic Zone
MCE	Mission Control Element
MOD	Ministry of Defence
NOTAM	Notice to Aviation
RPA	Remotely Piloted Aircraft
RPAS	Remotely Piloted Air System
SoN	Statement of Need
TCAS	Terminal Collision Avoidance System
UAS	Unmanned/ uncrewed Aircraft System
UAV	Unmanned/ uncrewed Air Vehicle

Introduction

This document forms part of Stage 3 of ACP-2021-078 and has been prepared in accordance with CAP 1616.

The aim of this document is to provide stakeholders with the information that they require in order to fully understand the Sponsor's proposal for enabling High Altitude Long Endurance (HALE) Remotely Piloted Aircraft (RPA) operations at RAF Fairford. This document will allow Stakeholders to provide feedback on the airspace options as part of consultation.

Scope

The scope of this consultation is limited to the implementation of segregated airspace in order to facilitate take-offs and landings of HALE RPA from RAF Fairford.

This document provides context to the proposal, including background on the airfield, local airspace, and general information about HALE RPA. It also outlines the evolution of design options which have been developed as a result of the Initial and Full Options Appraisal at Stages 2 and 3. These appraisals are more comprehensive assessments, and can be found on the CAA Airspace Change Portal.

Statement of Need

In order to support NATO's Agile Combat Employment concept, the US Air Force is making significant infrastructure investments on airbases in the UK and other allied nations. There is an emerging requirement for military aircraft, including Remotely Piloted Aircraft (RPA), to operate regularly from RAF Fairford. In accordance with CAP 722 – Unmanned Aircraft System Operations in UK Airspace – Guidance and Policy, beyond visual line of sight (BVLOS) operations require either a CAA-approved Detect and Avoid (DAA) capability or to remain within a block of airspace that is segregated from other airspace users. This ACP aims to establish suitable segregated airspace to enable RPA transition between RAF Fairford and high-altitude transit.

Several iterations of stakeholder engagement have already been conducted, including engagement on the drafting of design principles and the development of different design options. In conjunction with extensive stakeholder engagement during the option appraisal period, previous design options were re-designed and one viable option has emerged. The Sponsor is seeking to consult stakeholders on this option.

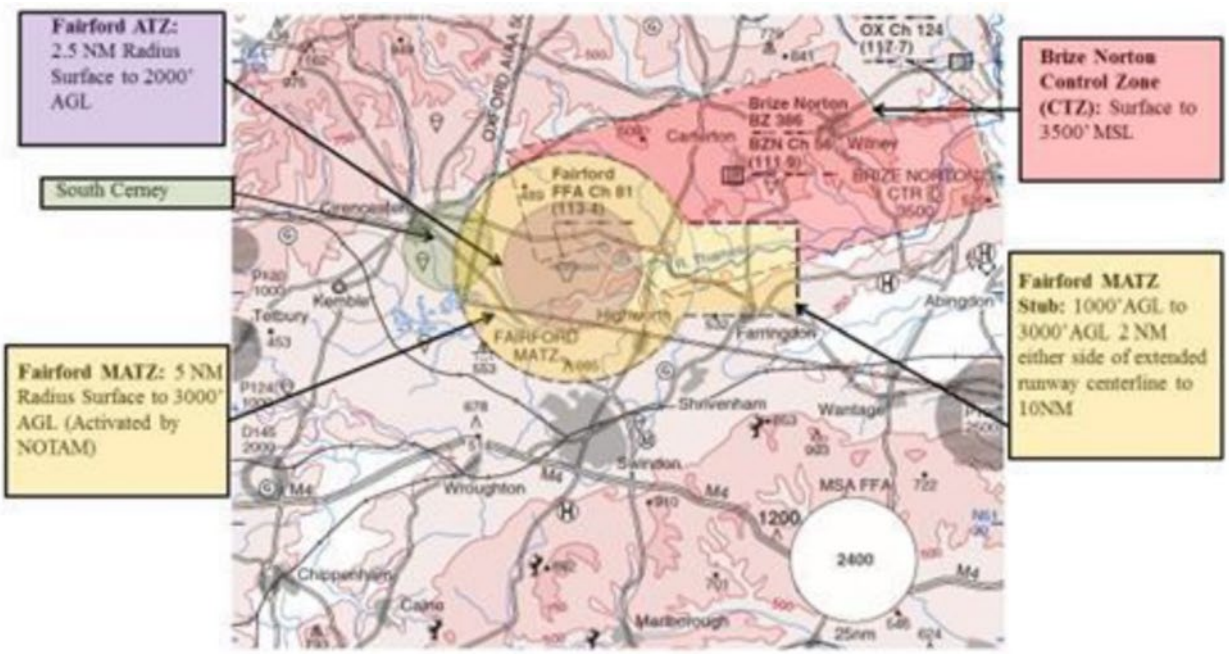
Section 1 - Context

Airfield and Local Airspace Overview

RAF Fairford is located in Gloucestershire, to the north of Swindon, and the east of Cirencester. It is home to the 99th Expeditionary Reconnaissance Squadron and supports Bomber Task Force operations. It is also host to the annual Royal International Air Tattoo (RIAT), which brings together the global aviation community to enjoy the sights and sounds of hundreds of aircraft from across the world and the ages.

The Fairford ATC Tower is staffed by US Air Force personnel providing Aerodrome Control Services, with all Radar Services provided by RAF Brize Norton ATC. RAF Fairford's ATZ is active 24 hours per day while its MATZ is activated by NOTAM when the airfield is open. Although the airfield and majority of ATZ and MATZ are contained within Class G airspace, there is some overlap with RAF Brize Norton's Class D CTR, which is active 24 hours per day. RAF Brize Norton ATC (call sign Brize Radar) is the controlling authority for the ATZ when RAF Fairford ATC is closed. Control instructions from the Brize Radar controller are mandatory for all military aircraft operating within the MATZ. Brize Norton ATC are the designated LARS unit for aircraft operating in the region, aiming to provide advice and information for the safe and efficient conduct of flight.

Airfield Overview



RAF Fairford and Brize Norton Airspace

In the local area are London Oxford Airport (formerly known as Kidlington), Cotswold Airport, and Gloucestershire Airport. There are also a number of smaller airfields which are busy with GA flying and several gliding, hang-gliding, and microlight sites. With the combination of commercial, business, military, and recreational aviation activity, the airspace in the region can be very congested during the daytime. At night, however, aviation activity outside of controlled airspace declines to close to zero[1].

[1] Preliminary ADS-B data review showed only one track outside of CAS in a week.

Local Airspace Overview

Directly above RAF Fairford are the Cotswold CTAs, which are Class A airspace primarily providing protection for commercial traffic climbing in and out of London airports. The lowest base of controlled airspace is CTA 4, just to the south of Fairford, at FL65.

Local Area Airspace

Operation of RPAS

The USAF currently operates several different RPA from bases around the world. Each RPA is controlled by a Launch and Recovery Element (LRE) and a Mission Control Element (MCE). The LRE is the local element that has a direct link with the aircraft and specialises in local airspace rules, requirements, and procedures. The LRE functions to launch and recover the aircraft. Shortly after takeoff, the MCE controls the RPA from a more remote location while the aircraft is transiting to and within the mission area.

In all instances, the pilots are fully qualified, instrument-rated, and operate exclusively under IFR. At all times, the pilot maintains two-way communications with the ATC unit via UHF and VHF radios. All aircraft utilise command and control data links to enable the pilots to have complete dynamic control of the aircraft. Because the pilot is not on-board the aircraft, they are not able to apply the “see and avoid” principle that is used in manned aviation to avoid collision with other aircraft and obstacles. All aircraft have Mode 3C transponders but do not have TCAS.

Throughout this document, reference is made to HALE RPA. HALE RPA are those that generally operate above FL400. The RQ-4 Global Hawk is a HALE RPA.

The RQ-4 Global Hawk has a wingspan of 130.9 feet and is 47.6 feet long. It is powered by a single turbofan engine. Take-off and landing of the Global Hawk is fully automated. During flight, the system has flexible levels of autonomy and can be flown on a pre-programmed route or be taken off that route by the pilot to follow ATC-directed headings and altitudes, as needed. The Global Hawk is also equipped with ADS-B.

Design Principles

After stakeholder engagement during Stage 1, the following list of Design Principles was developed and presented to the CAA. These principles were used to guide the development of airspace design options.

	Design Principle	Priority
a	Provide a safe environment for airspace users	1
b	Provide access to sufficient suitable airspace to enable efficient RPAS transition between the ground and medium/high-level transit routes	2
c	Minimise the impact to other airspace users	3
d	Adhere to FUA principles and strategy	3
e	Where possible and practicable, accommodate the Airspace Modernisation Strategy	4
f	Endeavour to make the airspace as accessible as possible	5
g	Minimise the environmental impact of non-participating aircraft	6

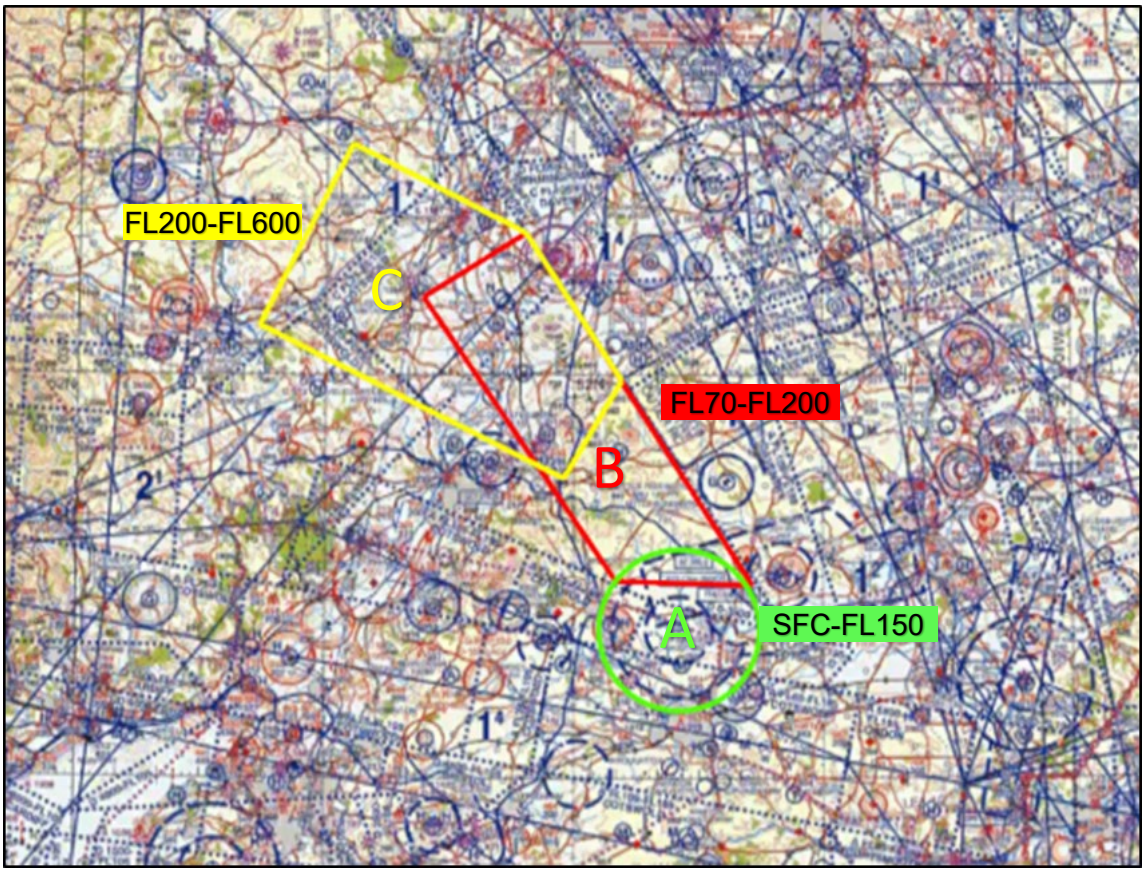
Section 2 - Design Options

Option 0 (Do Nothing)

In accordance with CAP 722, Unmanned Aircraft System Operations in UK Airspace – Policy and Guidance[2], any unmanned aircraft operating BVLOS requires a technical capability which has been accepted as being at least equivalent to the ability of a pilot of a manned aircraft to "see and avoid" potential conflicts. U.S. military HALE RPA currently lack this capability and require a block of segregated airspace to operate in the current regulatory environment. As such, the "do nothing" scenario would mean that U.S. military HALE RPA operations would not be possible.

HALE Option 1 (Discounted)

In this option, segment A is a 6 NM radius centred on RAF Fairford from the surface to FL150. Segment B is an 8 NM wide corridor that connects segment A to segment C. Segment B has an altitude of FL70-FL200. Segment C has an altitude of FL200-FL600. This option has been discounted due to stakeholder feedback and further analysis by the Sponsor since Stage 2. Further details are discussed later in this document.

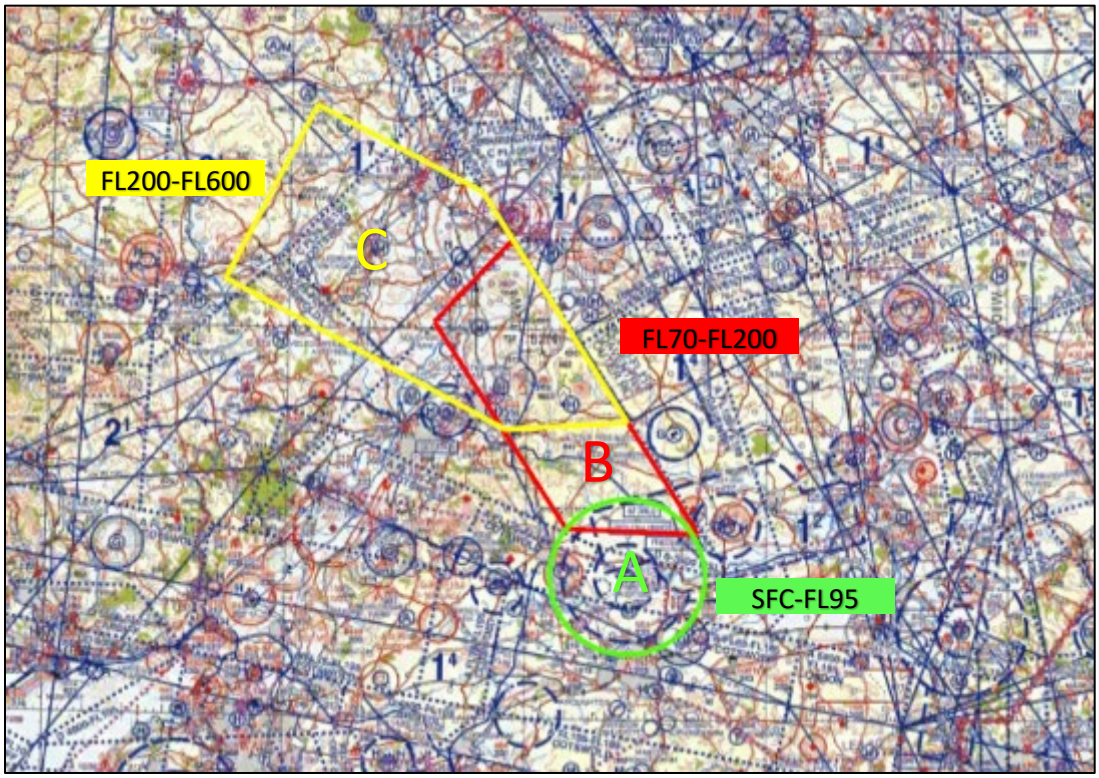


HALE Option 1

[2] CAP 722 Unmanned Aircraft System Operations in UK Airspace – Policy and Guidance

HALE Option 2 (Discounted)

In this option, segment A is a 6 NM radius centred on RAF Fairford from the surface to FL95. Segment B was designed to avoid Cotswold CTA 18 to the northwest. The altitude remains FL70-FL200. Segment C is slightly larger than HALE Option 1, and the altitude remains FL200-FL600. This option has been discounted due to stakeholder feedback and further analysis by the Sponsor since Stage 2. Further details are discussed later in this document.



HALE Option 2

Modification of HALE Options

After Stage 2, the Sponsor conducted further engagement with stakeholders on the expected impacts of HALE Option 1 and 2. Much of this was focused on determining the impacts from the NATS West Airspace Deployment planned for March 2023. Specific concerns were raised by stakeholders about the impact of Segment A. Stakeholder feedback indicated that the upper limit altitude of Segment A for both options would cause extensive impacts to flight planning for departures at adjacent airports. Additionally, the southern portion of Segment A for both options was identified as a major impact to civil traffic patterns.

The Sponsor also conducted further analysis and determined that the volumes of Segment C in HALE Options 1 and 2 were not sufficient to enable efficient RPAS transition between the ground and the operating altitude in all foreseeable contingency

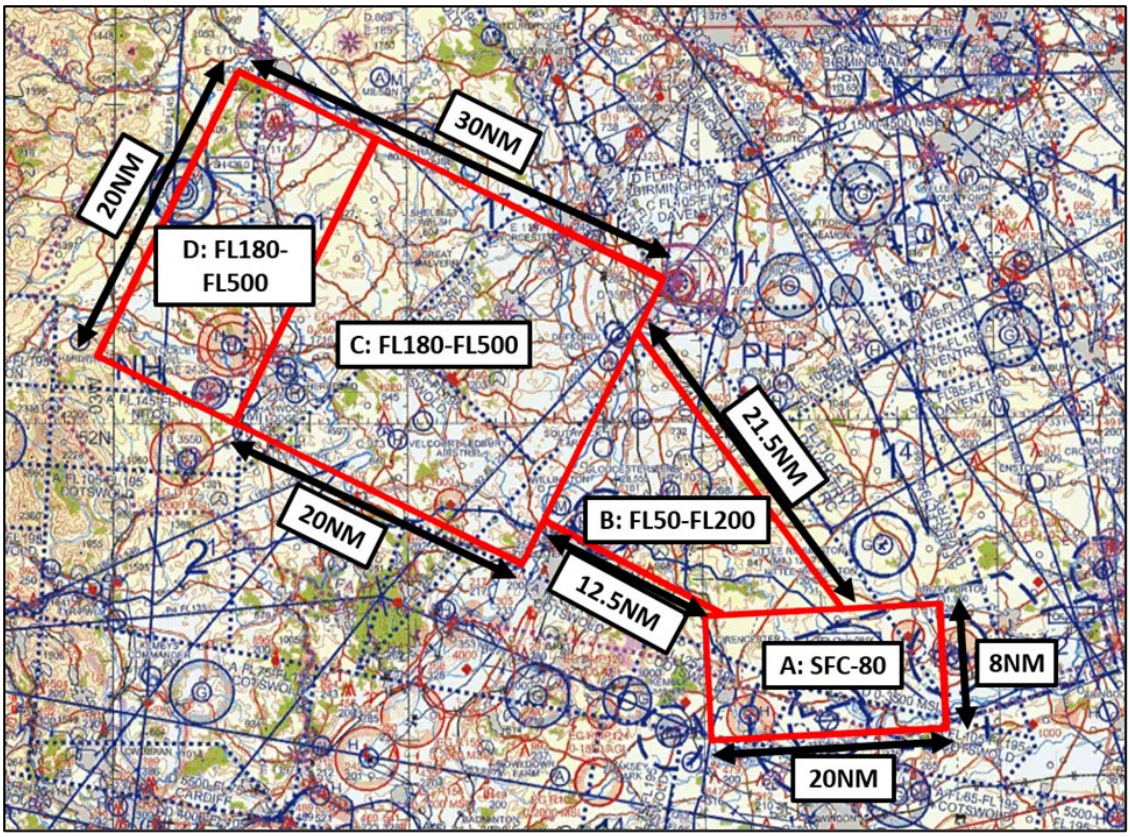
and emergency scenarios. A larger internal safety buffer was also deemed necessary to comply with the CAA's Safety Buffer Policy Letter.

Based on this engagement with stakeholders after Stage 2 and the Sponsor's further analysis, it was determined that HALE Options 1 and 2 were no longer viable. The Sponsor then worked with stakeholders on modifications to those designs that better aligned with the established design principles.

Interim HALE Option

The initial revision came about after further engagement with stakeholders on the options presented in Stage 2. The previous HALE options for Segment A included a 6 NM radius around RAF Fairford extending from the surface to FL95 and FL150 respectively. Stakeholders requested a revision that would limit the airspace footprint south of RAF Fairford and also requested that the upper limit of Segment A be lowered. The Sponsor responded by reducing the upper level of Segment A to FL80 and modifying the shape of Segment A to allow it to be shifted ~5 NM to the north.

After further safety analysis, Segment D was also added. This segment added operational flexibility in the event of adverse weather conditions, further minimising risks of excursion in situations such as abnormally high winds at altitude. This option also sought to reduce impacts to other airspace users by permitting a faster climb to operating altitude.

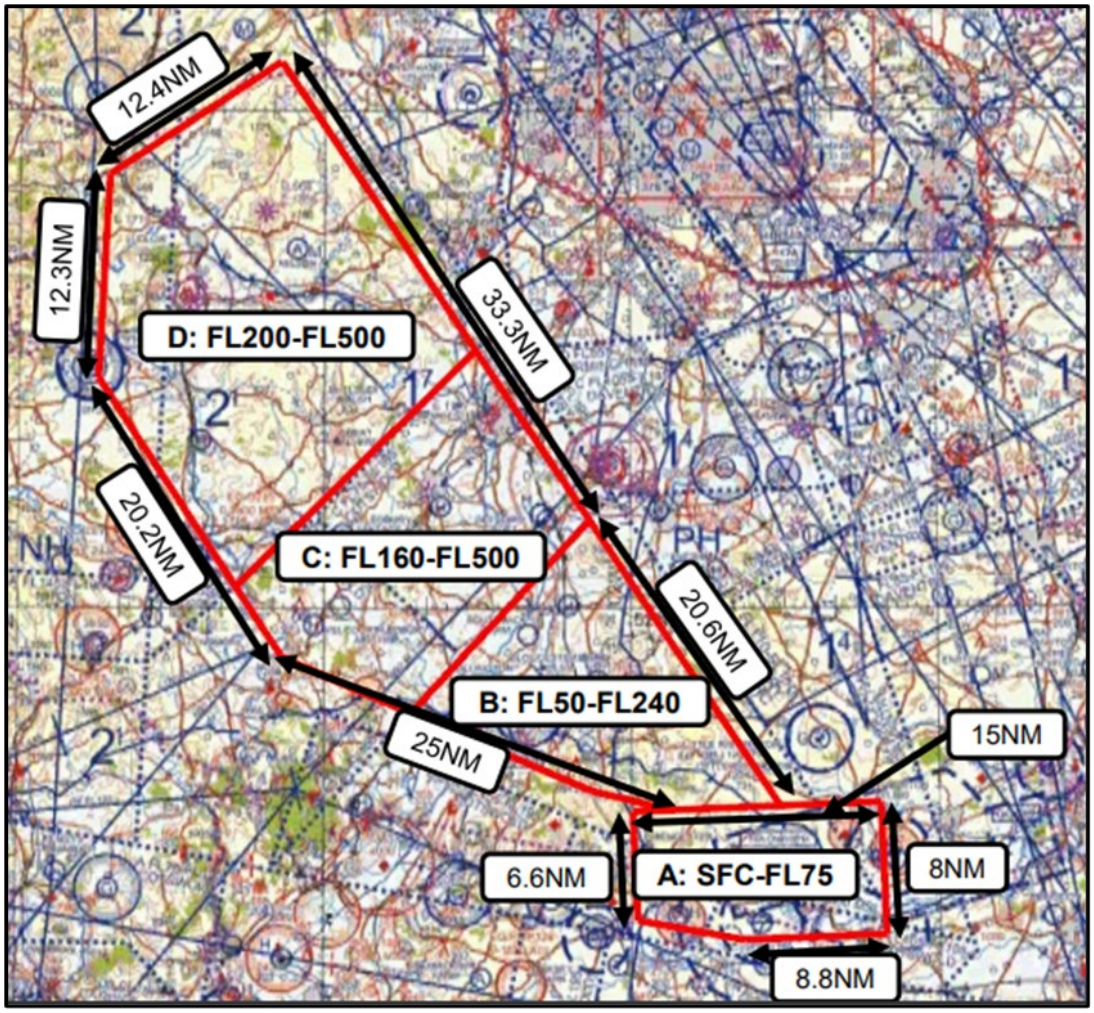


Interim HALE Option

HALE Option 3

After presenting the interim option, stakeholders requested that Segments C and D be shifted further north to reduce impacts to civil traffic. They further requested a shift of the boundary between Segment C and D. Finally, they requested Segment A be modified further by reducing the upper boundary to FL75 and eliminating overlap of adjacent CTAs in the SW corner. The Sponsor was able to comply with these adjustments resulting in HALE Option 3. HALE Option 3 provides a volume of airspace that permits HALE RPA departure from RAF Fairford followed by a turn to the north within Segment A and transition to Segment B. After a climbing transition through Segment B, the HALE RPA continues its climb within Segments C and D to its high-level transition altitude of FL500 or above. The process is reversed on arrival to RAF Fairford.

This option further allows for increased internal safety buffers and provides more operational flexibility for contingency situations. This greatly reduces the possibility of excursion and is assessed to be the minimum viable airspace needed to fully meet Design Principles A and B.



HALE Option 3

Airspace Utilisation

The proposed airspace is expected be activated 2-3 times per week for up to 3 hours per activation. To minimise the impact to airspace users, the Sponsor initially limited the activation window to between 1 hour after sunset and 1 hour before sunrise. Stakeholder feedback and data gathered since Stage 2 identified significant impacts during this window, primarily in the winter months. Based on this data, the Sponsor has agreed to further restrict the activation window to 20:00 – 05:30 UTC for normal operations. Any required activations between 1 hour after sunset and 20:00 UTC or 05:30 UTC and 1 hour prior to sunrise will be in extremis and coordinated in advance.

Compliance with Safety Buffer Policy

Per paragraph 3.3 of the CAA Safety Buffer Policy, where special use airspace is established only to support BVLOS UAS operating at indicated airspeed (IAS) of 150kts or less, the standard airspace buffer of 5 NM from the edge of a TMA, CTR, or CTA (excluding the Upper CTA) and 10 NM from ATS Routes above FL195 may, subject to appropriate mitigation, be reduced by 2 NM[3].

The Sponsor is seeking dispensation from the lateral requirements of this policy in accordance with the criteria referenced above and based on the information and mitigating factors below.

- HALE RPA operating from RAF Fairford will operate at or below 150kts IAS within the proposed Danger Areas at all times.
- Departure and arrival procedures in Segment A will provide at least a 3 NM lateral buffer from adjacent controlled airspace.
- A 2 NM internal buffer is planned in Segments B, C, and D.
- An external FBZ of 1 NM will be applied above FL245 AND where the airspace abuts CTAs or has an interaction with an ATS Route.
- Reduced risks will exist due to activation window during periods of lower traffic density (20:00 – 05:30 UTC).
- Reduced risk will exist due to activation duration of only 6-9 hours per week.
- Reduced risk will exist due to the planned provision of a DACS.

The Sponsor is also seeking to learn from the precedent established in ACP-2019-12, NATS West Airspace Deployment. Safety work undertaken by NATS and the MOD determined that a 1 NM lateral buffer was sufficient to be tolerably safe against BVLOS activity in SUA[4]. The Sponsor plans to seek out advice from Safety and Airspace Regulation Group (SARG) Manager, Airspace Regulation.

[3] SPECIAL USE AIRSPACE - SAFETY BUFFER POLICY FOR AIRSPACE DESIGN PURPOSES, para 3.3

[4] Free Route Airspace Deployment 2, Step 4B: Submit: Airspace Change Proposal, para 5.7.14

Future Intent

As described in Section 2, segregated airspace is currently required in order to facilitate HALE RPA operations from RAF Fairford. However, as either technology improves (with detect and avoid allowing flight outside of segregated airspace) or regulation around the operation of RPAS in UK airspace evolves, it is recognised that there may not be an enduring requirement for a Danger Area. To that end, the Sponsor will commit to a review of the segregated airspace requirement every 2 years. When the airspace is no longer required, the Sponsor will request to remove the airspace.

Reversal Statement

In accordance with CAP 1616, the Sponsor must provide a reversal statement to articulate the actions of the Sponsor if the airspace change does not achieve its objectives post-implementation. As the Sponsor is seeking a Danger Area that will be activated by NOTAM, should the airspace not achieve its intended aims the Sponsor will not activate the Danger Area, thereby not causing any impacts. The Sponsor will then seek an airspace re-design (requiring the Sponsor to conduct another airspace change) or request removal from the AIP.

Section 3 - Effects of the Proposed Option

Effect on Aviation Stakeholders

Based on previous stakeholder feedback, the Sponsor assesses that the proposed option could affect civil traffic in the ATS network, traffic departing and arriving at London Oxford Airport, and HEMS transits.

Although the impacts to military traffic do not need to be taken into account during environmental impact assessment, it is still important to ensure that those impacts are understood, and measures are taken to minimise them as much as possible.

The primary plan to mitigate impacts to civil and military aircraft is by providing a DACS. The ACP team will continue internal MOD and stakeholder engagement throughout this process on other possible ways to minimise impacts. The Sponsor welcomes additional feedback on suggested measures to minimise impacts to aviation stakeholders.

In Stage 2, several stakeholders provided feedback on impact to their aviation operations based on daytime activations. These comments have been noted, but the intent remains to activate the Danger Areas only at night, specifically between the hours of 20:00 – 05:30 UTC or, in extremis, between 1 hour after sunset and 20:00 and/or 05:30 and 1 hour prior to sunrise during the winter months. As such, only impacts on operations during these windows were used to assist with developing the Full Options Appraisal.

Environmental Effects

In Stage 2, an analysis of historical ADS-B data as well as stakeholder feedback confirmed that this change was not anticipated to result in impacts to civil aviation traffic patterns below 7,000 feet. Following Stage 2, this ACP was categorised as a Level M2 change.

Since this time, engagement with stakeholders and the Sponsor's further analysis determined that HALE Options 1 and 2 would introduce more impacts to civil traffic than initially expected and were no longer operationally viable. This led to the creation of HALE Option 3 as described in Section 2. HALE Option 3 was separately evaluated for impacts to civil traffic using a representative traffic sample provided by NATS Analytics. This sample confirmed that no impacts are expected below 7,000 feet for this design option, further validating the categorisation of this ACP as a Level M2 change. In accordance with CAP 1616, only CO_2 emissions are required to be assessed as a part of the Environmental Assessment of a Level M2 change.

Noise, Local Air Quality, Tranquility, and Biodiversity

Since no impacts are expected to civil traffic patterns below 7,000 feet, no adverse impacts related to noise, local air quality, tranquility, or biodiversity are expected.

While impacts to civil traffic patterns below 7,000 feet are highly unlikely, the Sponsor has planned impact mitigation efforts to include NOTAMs when proposed airspace

would be active, activation during periods of low traffic density, and the utilisation of a DACS.

CO_2 Emissions

An increase in CO_2 emissions is expected as a result of this change. The “worst case” scenario of this impact is presented in detail in Annex A of the Stage 3 Full Options Appraisal. The Sponsor will continue to engage with stakeholders on ways to mitigate this impact.

Section 4 - Consultation Process

Consultation Duration

The Sponsor intends to conduct a 6-week consultation, instead of the standard 12-weeks, due to the determination of nil impacts below 7,000 feet and the extensive engagement already undertaken with other users of the airspace as well as ATS providers.

It is the intent of the Sponsor to start consultation as soon as is practicable from the CONSULT gateway. In order to provide a short period of time post-Gateway decision for any minor rectification, the Sponsor would like to propose a consultation period from **9 October 2023 - 20 November 2023.**

Physical and virtual events will be held throughout the consultation window to allow stakeholders the opportunity to ask the Sponsor questions relating to the proposal. The following events are planned:

Virtual Consultation

- 24 October 2023 at 1300 via Microsoft Teams Meeting with a dial-in option
- 2 November 2023 at 1800 via Microsoft Teams Meeting with a dial-in option

The Microsoft TEAMS link will be advertised on the Citizens Space portal closer to the meeting date.

Physical Consultation

- 1x Meeting with RAF Brize Norton
- 1x Meeting with NATS
- 1x Meeting with 78 Squadron (Swanwick Military)

What is being asked?

The purpose of this consultation period is to provide an opportunity for all stakeholders to comment on the proposed airspace design option. This feedback will be collated and analysed by the Sponsor to help shape the final proposal that will be submitted to the CAA.

The key themes that the Sponsor is seeking to answer through consultation include, but are not limited to, the following:

a. Perceived effects of this proposal (positive or negative)

b. Key concerns for stakeholders

c. Mitigating factors that could be employed to minimise impact

How to respond

In accordance with CAP 1616, this consultation will be undertaken through electronic communication and it is therefore requested that stakeholders wishing to provide feedback do so through the Citizen Space online portal.

The link to the Citizen Space portal can be found HERE. A response form, along with all consultation documentation can be found on Citizen Space. Additionally, all documentation so far can be found on the CAA airspace change portal.

If stakeholders are unable to respond electronically, hard copies of feedback may be submitted to:

USAFE/UK
Unit 4840
RAF Mildenhall Bury St Edmunds
Suffolk IP28 8NF
OFFICIAL BUSINESS

All written responses will be subsequently uploaded to the CAA airspace change portal. Additionally, stakeholders requiring hard copies of any consultation material can request this by emailing USAFEA3.A3AA.USAFE_AIRSPACE@us.af.mil or writing to the address above.

Section 5 - Next Steps

Consultation responses will be collated and assessed throughout the consultation period. Once the consultation period has closed, the Sponsor will analyse and categorise all responses. A consultation report will then be published articulating the categorisation process, the issues raised, and how they have been resolved. Finally, it will confirm the final option to be submitted to the CAA including any additional amendments made to the chosen design as a result of consultation feedback. The Sponsor will then upload the document to the Portal once the CAA has confirmed that no further consultation is required.

The Sponsor will continue the ACP process in accordance with the agreed timeline, submitting all required documentation in Stage 4A and 4B in order to allow the CAA to conduct the DECIDE Gateway in February 2024.

Annex A – Consultation Feedback Form Hard Copy

1. What is your name?
(Required)

2. What is your email address?
(Required)

3. Are you responding as an individual or do you represent an organisation?
(Required)

- I am responding as an individual
- I am representing an organisation

What is your organisation?

4. What best describes your association with this airspace change?
(Required)

- Local community stakeholder
- Aviation stakeholder
- NATMAC organisation
- ATS Provider

5. The Sponsor endeavors to minimise the impact of its operations to other user of the airspace while still ensuring that required military activity can safely and efficiently be conducted. Are there any design amendments or potential mitigations that you think the Sponsor should consider to achieve this?

6. Do you expect to be impacted by this airspace change? If so, please describe the expected impact(s).

7. Are there other general considerations that you would like the Sponsor to consider in order to mitigate impacts?

8. The Sponsor would like your permission to publish your consultation response. Please indicate your preference.
(Required)

Publish response

Publish response anonymously (personal identifiers such as name and organisation will be removed)