Ministry of Defence

ACP-2021-078

Enabling Remotely Piloted Aircraft Operations from RAF Fairford

Stage 2A – Options Development

Stakeholder Engagement

Introduction

This document forms part of Stage 2 of ACP-2021-078. To ensure that any new stakeholders identified during or since Stage 1 are fully conversant with the proposal, this document includes an overview of the Statement of Need and Design Principles, which were presented during Stage 1. The ACP successfully passed its Stage 1 – 'Define' Gateway on 25th March 22 and a redacted version of the submission can be found on the CAA's airspace change portal[1].

The aim of this document is to provide stakeholders with a comprehensive list of Design Options that have been developed in line with the Design Principles and address the Statement of Need. Stakeholders are invited to provide feedback on whether they believe that the Design Options do align with the Design Principles and whether the Sponsor has properly understood and accounted for stakeholder concerns related to the Design Options. This feedback will assist the Sponsor in producing a Design Principle evaluation for each Design Option.

The document will also provide evidence to the CAA that the ACP Sponsor has conducted suitable stakeholder engagement during Stage 2A of the ACP, as detailed in CAP1616[2].

Although not specifically the purpose of this engagement, the Sponsor is happy to receive any general feedback on the Design Options and their suitability, or other aspects of the ACP. More detailed information about the shape and size of preferred Design Options, as well as a full appraisal of their impact, will be presented during Stage 3 – Consult, at which time there will be a 12-week formal consultation period.

Context

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[3], 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 medium- or high-altitude transit.

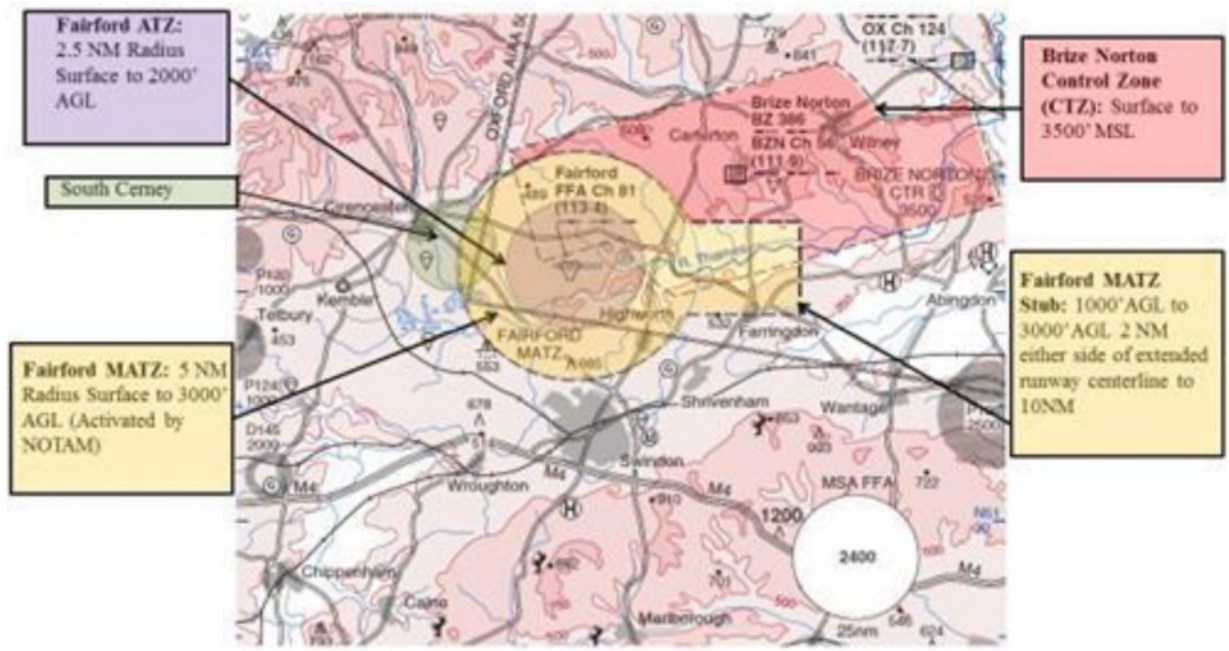
[1] Airspace Change Portal - ACP-2021-078
[2] CAP1616: Airspace change: Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information
[3] CAP 722: Unmanned Aircraft System Operations in UK Airspace - Guidance

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 Air Traffic Control (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 Aerodrome Traffic Zone (ATZ) is active 24 hours per day while its Military Air Traffic Zone (MATZ) is activated by Notice to Airman (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 Control Zone (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 Lower Airspace Radar Service (LARS) unit for aircraft operating in the region, aiming to provide advice and information for the safe and efficient conduct of flight.

Airfield Plan View



RAF Fairford and Brize Norton Airspace

In the local area are Oxford International Airport, Cotswold Airport and Gloucestershire Airport. There are also a number of smaller airfields which are busy with General Aviation (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[4].

[4] 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 Control Areas (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 Remotely Piloted Aircraft (RPA)

The USAF currently operates several different RPA from bases around the world. These include the RQ-4 Global Hawk and MQ-9 Reaper.

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 that specializes in local airspace rules, requirements, and procedures. The LRE functions to launch and recover the aircraft while en route to and from the mission area. The MCE controls the RPA from a more remote location while the aircraft is in the mission area.

In all instances, the pilot is fully qualified and instrument-rated and fly IFR exclusively. At all times, the pilot is in two-way communications with the appropriate air traffic control (ATC) unit via UHF and VHF radios. All aircraft utilize 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.

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

The MQ-9 Reaper has a wingspan of 66ft and is 36ft long. It is powered by a single turboprop engine. Take-off and landing of the Reaper is manually flown by the pilot. After take-off, the pilot can engage standard autopilot hold modes (heading, altitude, airspeed) or build a flight plan that the aircraft can automatically follow. The Reaper does not have ADS-B

Throughout this document, there will be references to Medium Altitude Long Endurance (MALE) and High-Altitude Long Endurance (HALE) RPA. MALE RPA are those that generally operate at or below FL400. HALE RPA are those that generally operate above FL400. The RQ-4 Global Hawk is a HALE RPA and the MQ-9 Reaper is a MALE RPA.

Remotely Piloted Aircraft Systems (RPAS) are the ground control stations, communications architecture, datalinks, and other equipment required to remotely fly an RPA.

Prior to any RPA flying into or out of RAF Fairford, it will have been approved by the CAA to operate in UK airspace.

Design Principles. After stakeholder engagement during Stage 1, the following list of Design Principles was developed and presented to the CAA. These principles will now be 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

Design Options

Option 0 (Do Nothing)

As discussed, manned aircraft utilise ‘see and avoid’ as a principle of separating from and avoiding collision with other aircraft. 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 conflictions (Detect and Avoid capability), a block of segregated airspace to operate, within which other aircraft are not permitted to operate simultaneously, or be able to demonstrate clear evidence to the CAA that the operation will pose no hazard to other aviation users. As none of the RPA planned for operations out of RAF Fairford are equipped with a suitable DAA capability, the ‘do nothing’ scenario would mean that RPA operations cannot commence.

The aspiration remains that, with developments in technology and a better understanding of RPA operations within the UK, BVLOS activity from RAF Fairford can eventually be integrated into all classes of airspace.

Segmented Design

The following airspace design options are considered to be suitable to measure against the design principles and can support the statement of need. They are separated into HALE and MALE options and one of each will be needed to meet the requirement outlined in the statement of need.

Segment A is used for take-off and initial climb out in segregated airspace. A minimum of a 6NM radius is required for this segment.

Segment B is used to facilitate climb and descent between Segment A and Segment C. In the following options, this airspace is 8NM wide with an altitude of FL70-FL200.

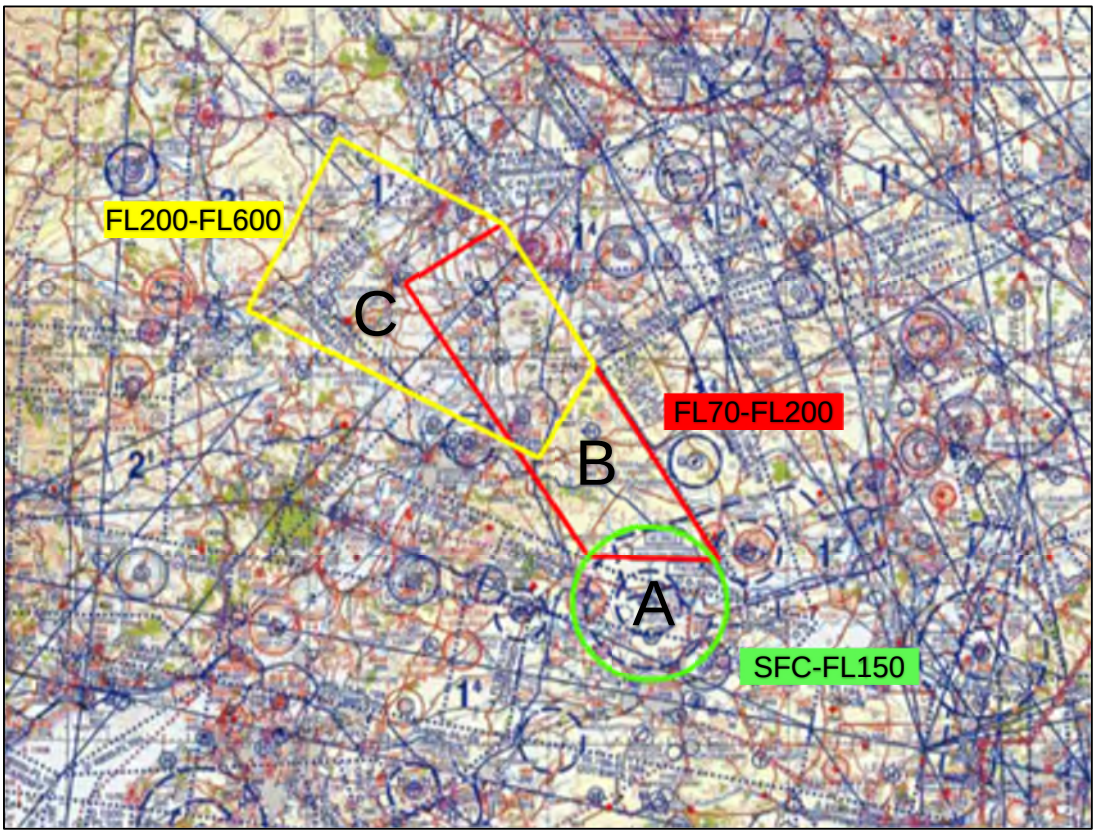
Segment C is used to facilitate further climb above FL200 as well as initial descent into RAF Fairford.

Medium Altitude Transit Corridors (TC) allow for a segregated transit corridor for medium altitude RPA to exit UK airspace or enter en route to arrival at RAF Fairford. Should the integration of MALE RPA with manned aircraft in controlled airspace be possible, this segregated corridor would not be required. The options for medium altitude transit corridors listed below are not exhaustive. The Sponsor welcomes feedback on any alternate location and/or altitudes for these transit corridors that would minimise the impact on other airspace users.

HALE Option 1

In this option, segment A is a 6NM radius centred on RAF Fairford from the surface to FL150. Segment B is an 8NM 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

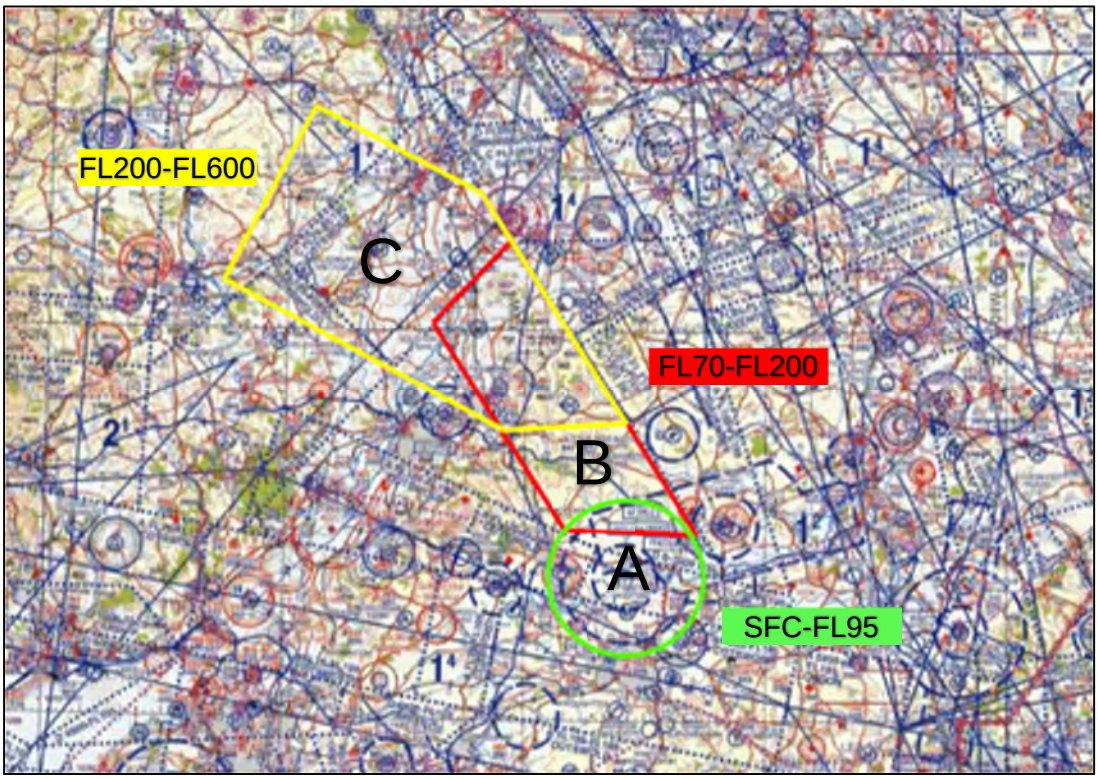
HALE Option 1



HALE Option 2

In this option, segment A is a 6NM radius centred on RAF Fairford from the surface to FL95. In this option, segment B avoids 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.

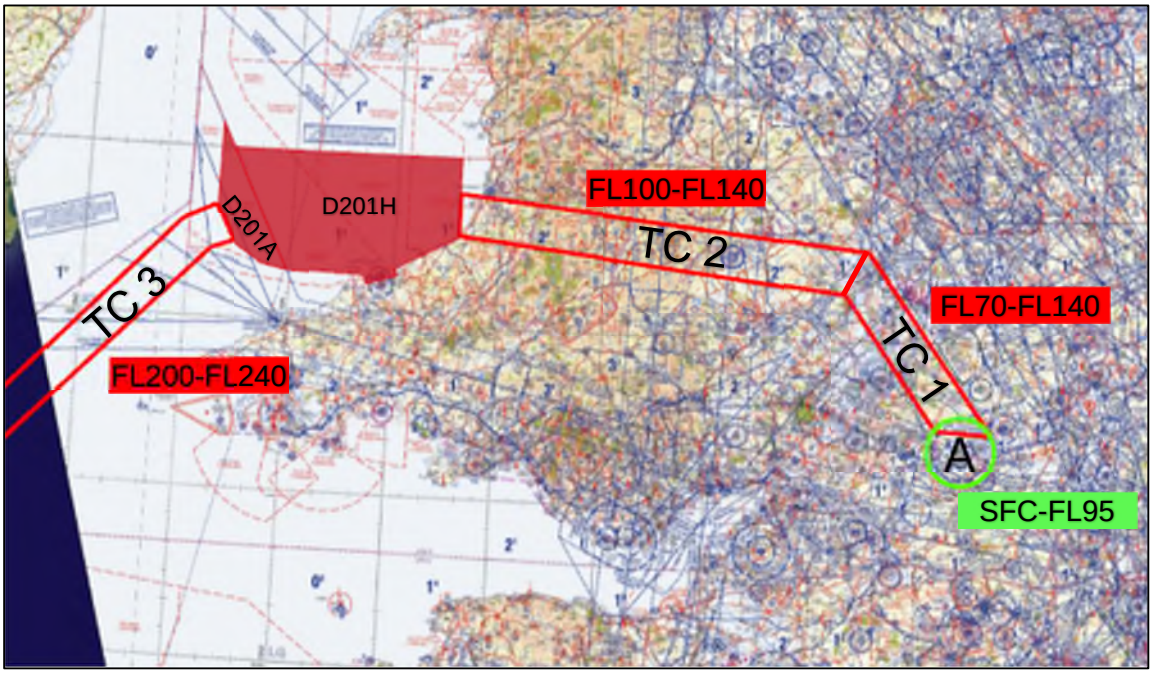
HALE Option 2



MALE Option 1

In this option, segment A is a 6NM radius centred on RAF Fairford from the surface to FL95. In order to facilitate a segregated transition out of UK airspace, an 8NM-wide transit corridor connects segment A to Danger Area D201 and then southwest to the edge of the FIR. This option segments the corridor into three with different altitudes.

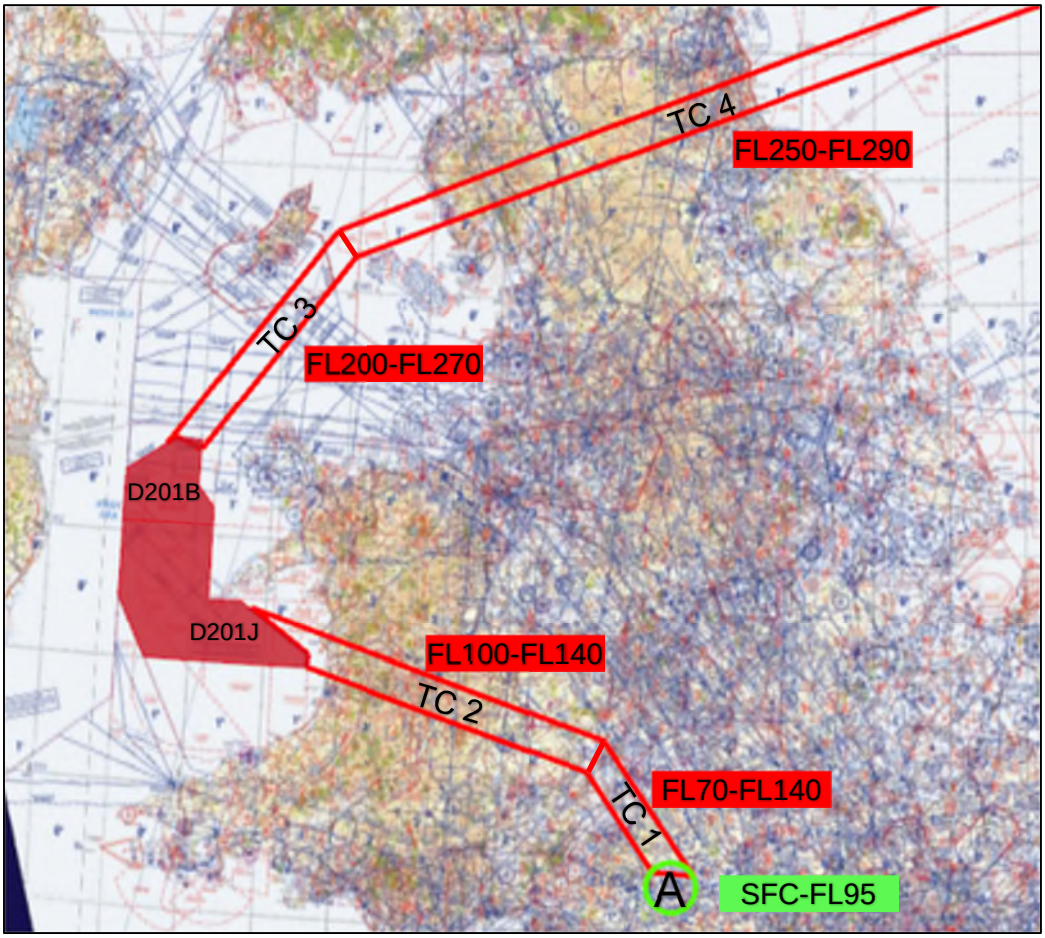
MALE Option 1



MALE Option 2

In this option, segment A is a 6NM radius centred on RAF Fairford from the surface to FL95. In order to facilitate a segregated transition out of UK airspace, an eight nautical mile wide transit corridor connects segment A to Danger Area D201 and then northwest to the border of the Copenhagen FIR. This option segments the corridor into four with different altitudes, as needed, to minimise impacts to other airspace users.

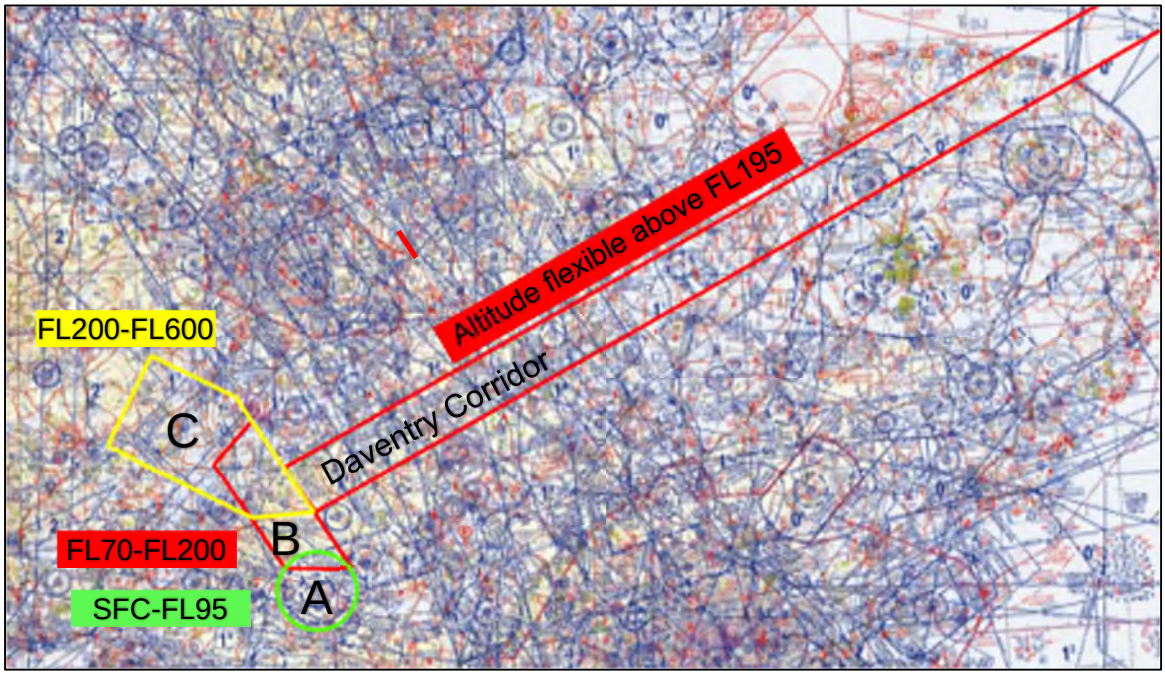
MALE Option 2



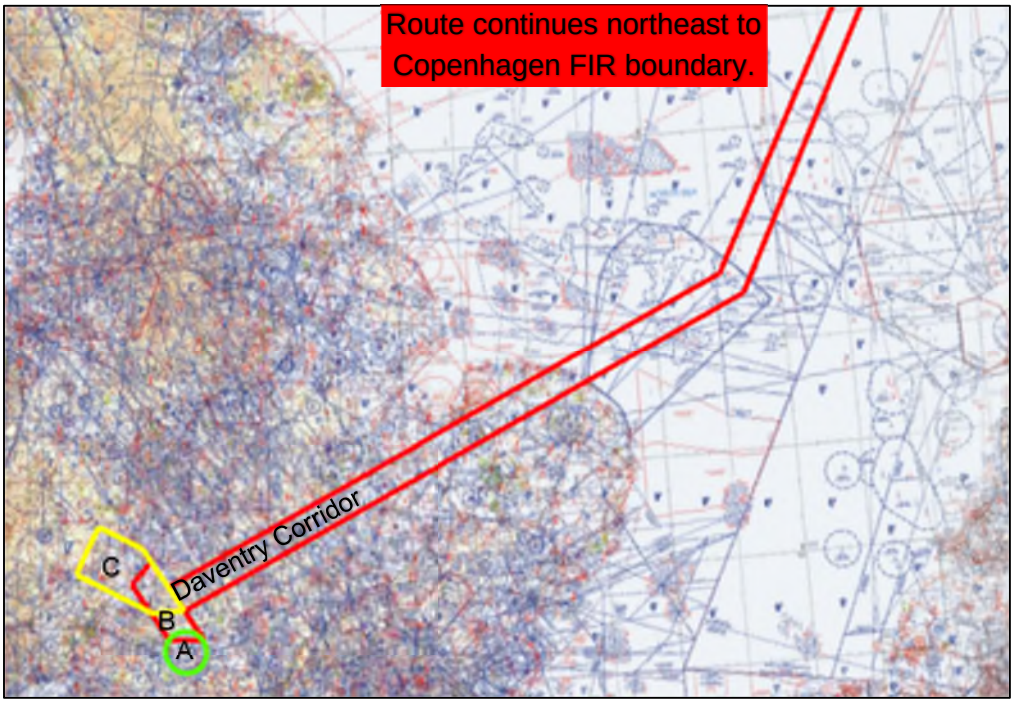
MALE Option 3

In this option, a west to east MALE corridor is paired with segments A, B, and C from HALE Option 2. This design allows MALE RPA to climb in segments A, B, and C then transition in airspace above the Daventry Corridor and then northeast to the border of the Copenhagen FIR. The reverse would apply for RPA inbound to RAF Fairford.

MALE Option 3



MALE Option 3



MALE Option 4 - Integration

Should integration of MALE RPA into controlled airspace be possible, MALE RPA operations would only require a segregated segment A from SFC-FL95. From there, RPA would be able to enter controlled airspace via Cotswold CTA 7 or CTA 4. The option of integration for MALE RPA is being pursued but the Sponsor is currently unsure it this is a viable option due to a lack of DAA capability.

MALE Option 4

Other Considerations

Volume of Airspace Required

In each of the options the volume of airspace is the minimum required to safely contain the RPA flight profiles. To enable more flexible airspace management, the designs are segmented. This means that only the required segments for each type of RPA would need to be activated on a given occasion, and individual segments can be ‘turned off’ when no longer required.

Airspace Utilisation

As previously stated, the main working assumptions for this ACP are that the proposed airspace is expected be activated approximately 2-3 times per week for approximately 3 hours per activation. However, the change sponsor is exploring activation periods that exceed these assumptions, both in frequency and time periods of utilisation with the availability of crossing service. In an effort to have as

little impact as possible on other airspace users, all activations will be between 1 hour after sunset and 1 hour before sunrise unless in extremis, which would be subject to case-by-case approval by the CAA. Each activation would be subject to a NOTAM at least 24 hours in advance.

Airspace Access

In order to make the airspace as accessible as possible, it is anticipated that an appropriate crossing service will be available from a suitable ATC unit. Options are still being explored, but these are expected to be RAF Brize Norton ATC at lower altitudes and Swanwick Military (78 Sqn) at medium and high altitudes.

Type of Airspace

The Design Options presented vary based on their shape and size, but the type of airspace allocated is an important factor to consider. Although segregated airspace for BVLOS activity is usually in the form of a Danger Area, and that remains the preferred option at this stage, the Sponsor has considered use of controlled airspace (CAS) or a transponder/radio mandatory zone (TMZ/RMZ) for the lower segment of airspace. CAS (class A or D) is considered to be overly restrictive on other airspace users and the associated ATC resource required, and a TMZ/RMZ, although a less restrictive means of providing a known-traffic environment, is unable to safely provide segregation as it is still reliant on see and avoid. For the higher segments of airspace, where they sit within classes A and C airspace, it may be possible to produce a safety argument for integration. The Sponsor welcomes feedback on how the airspace might be classified/designated.

Next Steps

Stakeholders are invited to provide feedback on the airspace design options and specifically whether they are aligned with and able to achieve the design principles developed in Stage 1. The feedback form provided alongside this document has been produced to aid in providing feedback.

Further, the Sponsor requests additional feedback from any stakeholder who expects their operations to be affected by this ACP. If you believe you fall into this category, please contact the Sponsor at the earliest opportunity to discuss the nature and extent of the expected impact.

Please note, the options presented are not yet fully developed. There will continue to be further refinement after receipt of stakeholder feedback during subsequent stages.

Completed forms, or any other feedback, should be sent to DAATM-AirspaceConsultation@mod.gov.uk by Thursday 2nd June 22.

The agreed timeline for this ACP is as follows:

Stage	Submission	Gateway
DEFINE GATEWAY	11 Mar 22	25 Mar 22
DEVELOP AND ASSESS GATEWAY	15 Jul 22	29 Jul 22
CONSULT GATEWAY	12 Aug 22	26 Aug 22
UPDATE AND SUBMIT	6 Jan 23	
DECIDE GATEWAY		28 Apr 23
IMPLEMENT		10 Aug 23