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21 Feb 2022

ACP 2020-026
Future Combat Airspace

GATEWAY DOCUMENTATION:
STAGE 2 Develop and Assess

STEP 2a(ii) Design Principle Evaluation
Version 2

Contents

References

1. CAP 1616 Airspace Change Process

2. All published documentation related to this airspace change proposal is available on the CAA Airspace Change portal: https://airspacechange.caa.co.uk/PublicProposalArea?pID=257

3. CAP 1430 UK ATM Vocabulary

4. ACP-2020-042 https://airspacechange.caa.co.uk/PublicProposalArea?pID=253

5. ACP-2021-007

Airspace change proposal public view (caa.co.uk)

Introduction – about this document, scope, background.

The Ministry of Defence, and specifically 11 Group Training Enablers, is the change sponsor for this proposal. The proposal seeks to secure Future Combat Airspace (FCA) for the use by UK and multi-national partners during occasional large scale, highly complex, multi-domain collective training exercises that are used to prepare aircrews for operational service.

This document forms part of the Airspace Change Proposal process as defined in CAP 1616 and should be read in conjunction with 2a(i) Options Development. For ease of reading the Statement of Need and Design Principles are re-iterated before the document outlines the options considered to meet the Statement of Need.

This is version 2 of this document and has been revised, alongside 2a(i), options development, following consultation with the CAA. The main change being the removal of other options to leave only one. This option will be assessed against the baseline, do nothing, option.

What was the statement of need for this proposal?

Air Command, on behalf of the Ministry of Defence, has an obligation to provide relevant tactical collective training to its combat and combat support forces to ensure UK Forces are correctly prepared to defend UK interests in line with the UK Defence Strategy. An appropriate airspace is required to meet this need; it must safely facilitate exercising large forces of modern and future air platforms in an efficient and representative combat environment.

Core military requirements:

Minimising the risk of Mid-Air Collisions (MAC) to the maximum extent whilst enabling;

- Full tactical employment of aircraft and weapons capability
- Supersonic flight and rapid height changes
- Overflight and loiter of rural overland (target) areas
- Use high and low altitude activity concurrently
- Representative employment ranges of simulated air-air and air-surface weapons
- Representative operational numbers
- Ability to oppose from ground and air simultaneously
- Contested in electromagnetic environment.

Changing external circumstances make current solutions untenable to deliver the required needs of Defence. Alternate airspace would diminish required training objectives for Defence and increase the risk to all air users to an unpalatable level. This change request will be, in part, informed by the associated trial data received through ACP-2020-042 and temporary activation ACP-2021-007.

Design principles

The design principles (DPs) were set following engagement with representative stakeholder groups as part of CAP1616 Stage 1; the DPs and their relative priorities are shown below. These will be used to evaluate the design options to determine which will be discarded and which will be progressed.

The table below comprises a consolidated list of the DPs at the end of Stage 1B, prioritised as shown and ready to take forward into Stage 2. Safety is the highest priority and DP(a) is automatically assigned Priority 1.

The MoD feels that the ability to complete its training and operational objectives is next in priority after safety and, since no stakeholder contested this, DP(b) is assigned Priority 2 along with the corresponding DP(e) about minimising impact to other airspace users.

The method of determining the remaining DPs order of prioritisation has been determined by the comments received, not just upon the volume of responses. It is anticipated in CAP1616 that design principles may conflict or that some would be more important to one organisation that another. Therefore, blending of the principles is required and, recognising all the comments provided through engagement, they are summarised as follows:

Priority	Design Principle
1	DP(a) The airspace design must be safe, with any hazards identified and risks mitigated such that they are as low as reasonably practicable and tolerable.
2	DP(b) The training area will be within efficient reach of RAF / United States Air Force (Europe) (USAFE) Main Operating Bases. DP(c) Optimise the airspace design to accommodate periodic large-scale multi-domain collective training activities. DP(e) Minimise impact on other airspace users and the network.
3	DP(h) Minimise the impact to Commercial Air Traffic flow, sector complexity and sector capacity. DP(g) Minimise environmental impacts including CO2 emissions. DP(f) Minimise environmental impacts including noise (where relevant).
4	DP(d) Optimise Airspace Management (ASM) applying Flexible Use of Airspace (FUA) principles and ASM Policy
5	DP(j) Minimise complexity in flight planning. DP(i) Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace. DP(k) Maximise the incorporation of results of the MOD's supporting Airspace trial – ACP-2020-042.

Table 1. Design Principles

A summary of design options is below

	Option	Description
0	Baseline	The "do nothing" option. Keep everything as it is currently, continue to use D323, D613 and Class G and C airspace.
1	Create new Special Use Airspace with overland portion (preferred option).	Create new Special Use Area, predominantly positioned in high seas airspace with overland portions on which ground threats and targets can be positioned.

Table 2. Design options summary

An initial evaluation of the potential options against the design principles is below.

Assessment Criteria

If a design principle is potentially achievable it will be marked as “partial” with action required to make it “met” described in the remarks; any viable options will be further appraised at stage 2b.

Priority	Ref	Design Principle	Qualitative criteria for met/not met/partial
1	DP(a)	The airspace design must be safe, with any hazards identified and risks mitigated such that they are as low as reasonably practicable (ALARP) and tolerable.	Met: All hazards mitigated to ALARP Partial: Some safety concerns Not met: Significant safety concern
2	DP(b)	The training area will be within efficient reach of RAF/United States Air Force (Europe) (USAFE) main operating bases.	Met: Most participants can reach the area and rtb without the need for AAR Partial: Around half of the participants wuold require AAR Not met: Most participants would require AAR
2	DP(c)	Optimise the airspace design to accommodate periodic large-scale, multi-domain collective training exercises.	Met: All training objectives can be met. Partial: Some improvement to the training airspace. Not met: No improvement to the training airspace.
4	DP(d)	Optimise airspace management (ASM) applying flexible use of airspace (FUA) principles and ASM policy.	Met: The proposal meets the FUA principles. Partial: Some elements are not FUA compliant. Not met: The proposal does not meet FUA principles.
2	DP(e)	Minimise impact on other airspace users and the network.	Met: There is minimal impact to other airspace users or the network. Partial: There is some impact on other airspace users or the network. Not met: There is significant impact to other airspace users and/or the network.
3	DP(f)	Minimise environmental impacts, including noise (where relevant).	Met: Minimal impact. Partial: Some impact. Not met: Significant impact.
3	DP(g)	Minimise environmental impacts, including CO2 emissions.	Met: Minimal impact. Partial: Some impact. Not met: Significant impact.
3	DP(h)	Minimise the impact to commercial air traffic flow, sector complexity and sector capacity.	Met: Minimal impact to GA and sector capacity. Partial: Minor impact to GA and sector capacity. Not met: Significant impact to GA and sector capacity.
5	DP(i)	Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace.	Met: Deconfliction of simultaneous activations would minimise disruption to stakeholders.

			Partial: Deconfliction of simultaneous activations would still cause minor disruption. Not met: Deconfliction of simultaneous activations is not possible.
5	DP(j)	Minimise complexity in flight planning.	Met: Minor increase in flight planning complexity. Partial: Some increase in flight planning complexity. Not met: Significant increase in flight plannig complexity.
5	DP(k)	Maximise the incorporation of results of the MOD's supporting airspace trial ACP2020-042.	Met: Many lessons learned from the trial are incorporated. Partial: Some lessons learned from the trial are incorporated. Not met: No lessons learned from the trial are incorporated.

Options evaluation – Option 0 – do nothing.

Description of option		**REJECT**	
Use existing airspace structure – conduct exercises in non-segregated Class G/C and existing MDA structure.			
Design principle a: The airspace design must be safe, with any hazards identified and risks mitigated such that they are as low as reasonably practicable and tolerable.	Not met	Partial	Met
The do nothing option results in familiar airspace with no changes. However Large Force Exercises would continue to take place outside of segregated airspace and potentially outside the MDAs. ATS provision would lower the risk of MAC but not to As Low As Reasonably Practicable (ALARP). There would be no extra protection in the form of segregated airspace and buffer zones for either military or civil traffic. Newcastle Airport are in favour of no change due to the proximity of the proposal to the airport and also have to consider the business risk – does this proposal make the airport unattractive to the airlines? In order to mitigate these, during the consultation phase, factors which need to be agreed upon are timings, length of activation, cadence of activation, time of year. The sponsor will consult Newcastle continuously throughout the design stage in order to ensure a connection to the network is maintained and the risk to their business is minimised.			
Design principle b: The training area will be within efficient reach of RAF/United States Air Force (Europe) (USAFE) main operating bases.	Not met	Partial	Met
Current MDAs can continue to be used for missionised training, see document 2a(i)1. If the proposal is not accepted, Large Force Exercises would continue to use MDAs in addition to Class G and C airspace in the proposed SUA area.			
Design principle c: Optimise the airspace design to accommodate periodic large-scale, multi-domain collective training exercises.	Not met	Partial	Met
The current MDA construct is of insufficient space and incorrect dimension for modern aircraft and weapon trg. In addition, there are insufficient areas on which to position ground based threats. It is possible to situate the Joint Threat Emitters anywhere and use Class G airspace to transit to their location however this could lead to more dispersed exercise traffic conducting high energy manoeuvres without segregation from GAT. Routes for AAR and ISR already exist however these may not always be suitable for Large Force Exercises.			
Design principle d: Optimise airspace management (ASM) applying flexible use of airspace (FUA) principles and ASM policy.	Not met	Partial	Met
Current MDAs are managed using FUA principles.			
Design principle e: Minimise impact on other airspace users and the network.	Not met	Partial	Met

Current D323 and 613 construct is restrictive to GA traffic. However they are well established and with minimal overland portions, other airspace users such as gliding/parachuting etc are not impacted. With the requirements for trg airspace and enablers changing due to the evolution of weapons and aircraft, there is the possibility that mil participants will spill outside of the MDAs. Use of Class G and C airspace outside of the MDAs would create a larger burden on ATC and ASACs.			
Design principle f: Minimise environmental impacts, including noise (where relevant).	Not met	Partial	Met
There would be no change. Most of the current MDAs are over the high seas, overland areas have a base level of FL150.			
Design principle g: Minimise environmental impacts, including CO2 emissions.	Not met	Partial	Met
There would be no change. The MoD is not required to assess the CO2 emissions of its traffic. No change to the structure would result in no additional CO2 emissions.			
Design principle h: Minimise the impact to commercial air traffic flow, sector complexity and sector capacity.	Not met	Partial	Met
The current MDAs are managed in accordance with FUA principles and managed by the MAMC. However, it is possible for mil aircraft to attempt their trg missions using Class G and C in the area specified under this proposal. Should this be the case, it will increase sector complexity and the burden on ATC and ASACS.			
Design principle i: Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace.	Not met	Partial	Met
There exist well established protocols for the management of MDAs.			
Design principle j: Minimise complexity in flight planning.	Not met	Partial	Met
No change. Current MDA structure is well known.			
Design principle k: Maximise the incorporation of results of the MOD's supporting airspace trial ACP2020-042.	Not met	Partial	Met
If the proposal is not accepted then the successes of the ACP-2020-042 trial and ACP-2021-007 activations would have been in vain. They represent a safe solution and have established relationships with affected stakeholders. The airspace was designed around existing route structures and TMAs/CTAs and lessons have been learned during each activation.			

Option 1

Description of option			**ACCEPT**
Create a portion of airspace over the North Sea with overland portions in NE England and SE Scotland			
Design principle a: The airspace design must be safe, with any hazards identified and risks mitigated such that they are as low as reasonably practicable and tolerable.	Not met	Partial	Met
An exclusive, segregated portion of airspace reduces the probability of MAC between exercise participants and GA. Newcastle airport have concerns about exercise traffic "spilling out" of the SUA. This proposal is for a volume of airspace large enough to accommodate all fast jet serials and those events with the most dynamic manoeuvres. A system using flight plan buffer zones with activation by MAMC could ensure only that exercise traffic and GAT are kept separate. Although the proposal is for impermeable, segregated airspace, one stakeholder expressed concern over aircraft in emergency having to travel extra miles. Aircraft in emergency will have priority in this airspace.			
Design principle b: The training area will be within efficient reach of RAF/United States Air Force (Europe) (USAFE) main operating bases.	Not met	Partial	Met
A SUA established along the Eastern coast of the UK roughly equidistant between RAF Lossiemouth and the main operating bases in East Anglia is within range of all exercise participants without the need for air-to-air refuelling and is the preferred location for all MoD stakeholders. This geographical area also has diversion airfields available.			
Design principle c: Optimise the airspace design to accommodate periodic large-scale, multi-domain collective training exercises.	Not met	Partial	Met
During the next stage of the CAP 1616 process, we will propose a shape which is suitable to achieve the training objectives of a Large Force Exercise. All stakeholders questioned the cadence of activations using this proposed SUA. It is proposed that the following Large Force Exercises would use the SUA: Exercise COBRA WARRIOR (~12-15 missions per exercise lasting up to 3 hrs per mission). Held twice a year. STORM WARRIOR (~6 missions lasting 3 hours each). Held twice a year. RISING PANTHER is held 6 times per year, twice a month in Feb, June and Nov with 3 missions per exercise lasting 3 hours each. An overland portion of airspace would be required on which to situate simulated land based threats. Newcastle airport in particular expressed concerns as to how this would affect their operation. This proposal will aim to design an airspace structure which satisfies this DP but also avoids the Newcastle CTZ.			

Ideally, the SUA should be available from SFC to FL660 to allow for the full operational envelope and the inclusion of rotary wing and naval vessels. The sponsor acknowledges that this would be restrictive on other airspace users and is proposing a base of FL85 in mitigation. Minimum lateral dimensions are 160nm by 90nm. The sponsor proposes to work with expert airspace designers to achieve this whilst also causing minimal disruption to the network.			
Design principle d: Optimise airspace management (ASM) applying flexible use of airspace (FUA) principles and ASM policy.	Not met	Partial	Met
The proposed SUA could be managed by the MAMC and activated by NOTAM. It should only be activated for specific, named exercises generally for durations of 3 hours at a time. Flight Plan buffers both geographical and temporal would be considered. The geographical area for this proposal is in a gap between 2 existing MDAs and the sponsor acknowledges that should they all be active concurrently, this would not be in the spirit of FUA principles. MoD would seek to design the airspace with alternate routes for when multiple MDAs are active or could design protocols and/or LOAs between MoD, NATS and Swanwick to prohibit the activation of other MDAs and Low Flying Areas concurrently.			
Design principle e: Minimise impact on other airspace users and the network.	Not met	Partial	Met
The region hosts a number of airports and other airspace users, including gliding sites. It straddles the London and Scottish FIR with Low Flying Areas 12 and 16 situated within. Reporting points used by North Atlantic Tracks (NAT) and traffic routing via the Amsterdam and Copenhagen FIR are within the proposed area. All airspace users were concerned as to how the proposal would affect their operations. In particular, Newcastle Airport and the Borders Gliding Club would like measures in place so that they can continue to operate. As a result of this, the MoD proposes that the SUA would avoid TMAs and CTAs in addition to proposing a base level of FL85 in order to allow VFR traffic to continue to operate however further consultation will continue with the stakeholders from the gliding community. The sponsor would work with the airspace designer to design the SUA to maintain connectivity between the airports and the network. It is proposed that connections between the Scottish TMA and the Copenhagen and Oslo FIRs are maintained, and the Oceanic flow remains unaffected. Key to this DP is intelligent design and MoD will work closely with NATS to investigate specific shapes within the proposed area which would minimise impact on other airspace users and the network. A solution for ATS provision for routes affected will be agreed during stage 3.			
Design principle f: Minimise environmental impacts, including noise (where relevant).	Not met	Partial	Met
In order to reduce the noise footprint, rather than a base level SFC, the sponsor proposes a base for the SUA of FL85. This is also in response to Newcastle Airport's concern that there would be an increase in noise complaints. By avoiding CTAs standard approach and departure patterns can continue to be flown resulting in no change to patterns below 7000'.			
Design principle g: Minimise environmental impacts, including CO2 emissions.	Not met	Partial	Met

MoD is not required to assess CO2 emissions for military aircraft but to assess whether there is an impact due to aircraft having to re-route as a result of the change. The sponsor will work with NATS or Eurocontrol to assess the CO2 impact of airspace designs and, during Stage 3, modelling will be requested during to evaluate the number of aircraft affected and the number of extra (if any) track miles flown. The Department for Transport formulae will then be used to work out a value for the CO2 emissions. It should be noted here that during temporary activations of similar airspace which have resulted in D323 being suppressed, many routes benefitted from shorter tracks and resulting lower CO2 emissions. Simulations will be required to assess whether the savings made on NAT are balanced or outweighed by aircraft on domestic or intra-continental flights having to route around the proposed SUA.			
Design principle h: Minimise the impact to commercial air traffic flow, sector complexity and sector capacity.	Not met	Partial	Met
NATS highlighted the requirement for a solution for Newcastle's traffic as this proposal potentially blocks their connection to some of their routes. The sponsor proposes that TMAs and CTAs will be avoided and that connections to airports will be maintained, the sponsor proposes to work closely with the ANSPs concerned to enable this. The SUA proposed in this ACP seeks to avoid those areas already saturated with upper and lower ATS routes. Obvious areas to avoid being SE England, the spine of mainland UK and NW England. There are areas with fewer routes, these being W Scotland, Wales, SW England, E Anglia and NE England. The proposal for use of airspace off the NE England/SE Scotland is sympathetic to the UK route network. As the key stakeholder in this regard, the sponsor will work closely with NATS with the aim of establishing segregated airspace separated from commercial air routes temporally and laterally. Free Route Airspace will change the routes currently being used. The sponsor proposes to work with NATS to design a structure posing minimal disruption to FRA routes.			
Design principle i: Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace.	Not met	Partial	Met
NATS were concerned that the activation of a SUA in the geographical area proposed would have serious impact on ATS routes when existing MDAs are active. Protocols could be agreed restricting activations of multiple volumes of SUA and enable GAT to FPL and operate along Conditional Routes (CDRs), Free Route Airspace and notified DCTs. MAMC would continue to co-ordinate and prioritise requests, including for this proposed SUA, should it be approved.			
Design principle j: Minimise complexity in flight planning.	Not met	Partial	Met
NATS sought confirmation that arrangements would be made for the routing of traffic to avoid the SUA. The sponsor intends to work with NATS airspace designers to create geographic and temporal flight plan buffer zones. The SUA should be activated by NOTAM and visible to the network, enabling GAT to FPL and operate along Conditional Routes (CDRs), Free Route Airspace and notified direct tracks (DCT)s which avoid the proposed SUA. Temporal buffers could be applied between activity periods to allow GAT to reconfigure to alternating airspace configurations and thus ensure FPL acceptance and safe segregation of airspace structures for military use.			

Design principle k: Maximise the incorporation of results of the MOD's supporting airspace trial ACP2020-042.	Not met	Partial	Met
A body of evidence continues to be gathered under ACP-2021-007 which builds upon the lessons learned during ACP-2020-042. Many relationships and good practices have been forged which must form the basis for the ASM procedures for this proposal. To do otherwise would be a travesty and reflect detrimentally on the learning culture of the organisation.			

Conclusion

The proposed SUA meets the design principles. Key stakeholders who have influenced the design at this stage were NATS, Newcastle Airport and the Borders Gliding Club, their input has allowed the sponsor to develop the proposal.

DPs marked as “partial” will be met but require further consultation with stakeholders. The most important DP, that of safety, is key in this proposal and this document and the Options Development document highlight that use of unsegregated airspace poses more of a risk to participating aircraft and to GAT. The sponsor will continue to engage and will consider all new information which arises.

The “do nothing” option will now be eliminated but will remain as the baseline against which to measure the effects of this proposal. Option 1 will be formally appraised under Stage 2 Step 2b, Options Appraisal (Phase 1 Initial) including Safety Assessment.

Continued engagement and consultation will take place with any findings taken into consideration. Stage 3 will quantify the effects, the sponsor intends to use information obtained from the Eurocontrol Network Manager to inform this proposal.