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**ACP 2020-026
Future Combat Airspace**

**GATEWAY DOCUMENTATION:
STAGE 2 Develop and Assess**

STEP 2a(ii) Design Principle Evaluation

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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 various options considered to meet the Statement of Need.

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 than 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 and D613.
1	Create new Special Use Airspace with overland portion (preferred option).	Create new Special Use Airspace with similar dimensions to TDA 597 with overland portions on which ground threats and targets can be positioned.
2	Create new Special Use Airspace with overland portion based upon trial TDA 598	Airspace based upon the dimensions of TDA 598.
3	Create Special Use Airspace as in option 1 with additional lateral dimensions for air to air re-fuelling and force regeneration.	Additional areas in order to avoid aircraft “spilling over” outside of the exercise airspace.

Table 2. Design options summary

An initial evaluation of the potential options against the design principles is below. This is a rudimentary evaluation, not an evaluation of a detailed design, therefore if a design principle is potentially achievable it will be marked as met and annotated 'potentially' any viable options will be further appraised at stage 2b.

Options evaluation

Option 0

Do nothing			
Description of option			
Use existing airspace 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
This option results in familiar airspace with no changes.			
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
The current structure isn't geographically optimal for all exercise players eg Lossiemouth through to E Anglia.			
Design principle c: Optimise the airspace design to accommodate periodic large-scale, multi-domain collective training exercises.	Not met	Partial	Met
The current construct is of insufficient space and incorrect dimension for modern aircraft and weapon trg.			
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 617 construct is restrictive to GA traffic.			
Design principle f: Minimise environmental impacts, including noise (where relevant).	Not met	Partial	Met
Design principle g: Minimise environmental impacts, including CO2 emissions.			
Design principle h: Minimise the impact to commercial air traffic flow, sector complexity and sector capacity.			
Design principle i: Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace.	Not met	Partial	Met
Design principle j: Minimise complexity in flight planning.			
Design principle k: Maximise the incorporation of results of the MOD's supporting airspace trial ACP2020-042.	Not met	Partial	Met

Option 1

Create special use airspace with overland portion			
Description of option			
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
This option maximises lessons learned from ACP-2020-042 and ACP-2021-007			
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
Design principle c: Optimise the airspace design to accommodate periodic large-scale, multi-domain collective training exercises.			
Design principle d: Optimise airspace management (ASM) applying flexible use of airspace (FUA) principles and ASM policy.			
Activation only when required to comply with FUA protocol.			
Design principle e: Minimise impact on other airspace users and the network.	Not met	Partial	Met
Through notified activations and new reporting points.			
Design principle f: Minimise environmental impacts, including noise (where relevant).	Not met	Partial	Met
Early engagement – no changes below 7000' so no noise issues.			
Design principle g: Minimise environmental impacts, including CO2 emissions.	Not met	Partial	Met
Initial feedback from NATS suggests lower CO2 impact due to suppression of D323 during trial activation. Can be modelled further.			
Design principle h: Minimise the impact to commercial air traffic flow, sector complexity and sector capacity.	Not met	Partial	Met
The creation of a CTA to facilitate Newcastle traffic to facilitate a long-term solution will be investigated with NATS.			
Design principle i: Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace.	Not met	Partial	Met
These would be written in to the agreement and managed by MAMC.			
Design principle j: Minimise complexity in flight planning.	Not met	Partial	Met
ASM protocols including a CTA and routing points to circumnavigate a MDA would be implemented.			
Design principle k: Maximise the incorporation of results of the MOD's supporting airspace trial ACP2020-042.	Not met	Partial	Met
This option would maximise data gathered from ACP-2020-042 and ACP-2021-007			

Option 2

Create Special Use airspace over the North Sea with overland portion based on D598			
Description of option			
Create a portion of airspace over the North Sea with small overland portions in NE England.			
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
Feedback from TDA EG D598 identified the requirement for network visibility.			
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
Design principle c: Optimise the airspace design to accommodate periodic large-scale, multi-domain collective training exercises.			
	Not met	Partial	Met
Insufficient overland portions on which to present ground threats.			
Design principle d: Optimise airspace management (ASM) applying flexible use of airspace (FUA) principles and ASM policy.	Not met	Partial	Met
EG D 598 managed tactically – GAT unable to flightplan.			
Design principle e: Minimise impact on other airspace users and the network.	Not met	Partial	Met
Lessons learned from D598 activation could be applied.			
Design principle f: Minimise environmental impacts, including noise (where relevant).	Not met	Partial	Met
Early engagement – no changes below 7000' so no noise issues.			
Design principle g: Minimise environmental impacts, including CO2 emissions.	Not met	Partial	Met
Geographical area similar to that used in trial with positive results.			
Design principle h: Minimise the impact to commercial air traffic flow, sector complexity and sector capacity.	Not met	Partial	Met
The creation of a CTA to facilitate Newcastle traffic to facilitate a long-term solution will be investigated with NATS.			
Design principle i: Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace.	Not met	Partial	Met
These would be written in to the agreement and managed by MAMC.			
Design principle j: Minimise complexity in flight planning.	Not met	Partial	Met
ASM protocols including a CTA and routing points to circumnavigate a MDA would be implemented.			
Design principle k: Maximise the incorporation of results of the MOD's supporting airspace trial ACP2020-042.	Not met	Partial	Met
Different geographical area however ASM principles would benefit from the trial.			

Option 3

Create Special Use airspace as in option one with the addition of “fillets”			
Description of option			
In addition to the dimensions at option 1, additional airspace for air-to-air refuelling and force regeneration.			
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 addition of extra airspace does not guarantee ex participants will remain within – no additional benefit.			
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
Design principle c: Optimise the airspace design to accommodate periodic large-scale, multi-domain collective training exercises.	Not met	Partial	Met
Design principle d: Optimise airspace management (ASM) applying flexible use of airspace (FUA) principles and ASM policy.	Not met	Partial	Met
Extra segregated airspace constructed for activity which normally takes place in non-segregated airspace.			
Design principle e: Minimise impact on other airspace users and the network.	Not met	Partial	Met
The additional areas would infringe on existing routes.			
Design principle f: Minimise environmental impacts, including noise (where relevant).	Not met	Partial	Met
All activity would be above FL85 – no impact			
Design principle g: Minimise environmental impacts, including CO2 emissions.	Not met	Partial	Met
Initial indications suggest that suppressing D323, 513, 613 has positive effect on CO2 emissions.			
Design principle h: Minimise the impact to commercial air traffic flow, sector complexity and sector capacity.	Not met	Partial	Met
Extra segregated airspace constructed for activity which normally takes place in non-segregated airspace.			
Design principle i: Optimise protocols for deconfliction of simultaneous activations of multiple volumes of Special Use Airspace.	Not met	Partial	Met
Extra segregated airspace constructed for activity which normally takes place in non-segregated airspace.			
Design principle j: Minimise complexity in flight planning.	Not met	Partial	Met
Design principle k: Maximise the incorporation of results of the MOD’s supporting airspace trial ACP2020-042.	Not met	Partial	Met

How will we decide which options to progress to the next phase?

Design principle a relates to safety and is priority 1, any options not meeting this will be rejected.
 Design principles b,c and e are priority 2 and are about minimising the impact to the network and creating the ability to hold large scale military training exercises. As this is the main aim of this ACP, any options not meeting this will be rejected.
 Design options may progress even if DPs with a priority of 3 or lower are not met.

Conclusion

		Design Principle											
Design Option		a	b	c	d	e	f	g	h	i	j	k	Accept or reject
	Option 0	Green	Yellow	Red	Yellow	Yellow	Green	Green	Green	Green	Yellow	Red	Red
	Option 1	Green	Green	Green	Green	Green	Green	Green	Yellow	Yellow	Yellow	Green	Green
	Option 2	Yellow	Green	Red	Red	Yellow	Green	Green	Green	Green	Green	Yellow	Red
	Option 3	Yellow	Green	Green	Red	Red	Green	Green	Red	Red	Red	Yellow	Red