



English Channel Airspace Requirements – (ACP 2021 088)

Stage 2A – Options Development: Design Principle Evaluation 24 February 2023.





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Introduction

Bristow is currently progressing ACP-008-2021 on behalf of the Maritime and Coastguard Agency (MCA). This ACP aims to deliver a suitable airspace construct, to enable Uncrewed Aircraft Systems (UAS) operations to support HM Coastguard and the wider UK Government response to small boat crossings of the English Channel.

This document should be read in conjunction with complementary documents:

- Stage 2A Options Development: Design Principle Evaluation dated 24 Feb 2023.
- Stage 2A Design Options version 5, dated 23 Dec 23.
- Stage 1B Stakeholder Feedback Post Stage 1B Engagement period, dated 13 Dec 23.
- Stage 1B Stakeholder Engagement Document (Design Principles), dated 22 Sep 23.
- Stage 1A Statement of Need, dated 5 Jan 22.

This document provides detailed information on the airspace options, which were developed through engagement with stakeholders.

This Document

- The purpose of this document is to consider the comprehensive list of airspace design options against its design principles, progressing those that are viable, and if appropriate, discount the unviable options. The design principles are listed in Table 1 below.
- The purpose of the Design Principle Evaluation is to qualitatively assess each design option against each of the Design Principles. The evidence is high level and based on subject matter experts, and feedback received from stakeholders during Stage 1B and 2A.
- As part of Stage 2A we re-engaged with the stakeholders' that were engaged during Stage 1. We provided the stakeholders with information, explaining our design constraints / assumptions and draft airspace design options. The assessment summarised within this document states whether each design principle is met, partially met, or not met, for each draft airspace design option. Each option is assessed in isolation as they are mutually exclusive.
- Stage 3 is where the draft design options can be further refined.
- A 'do nothing' or 'baseline' option Option 0 has also been included for comp purposes.







- This document along with Stage 2A Options Development Airspace Design Options, dated 24 February 2023, will be submitted to the CAA on the 24 Feb 23.
- All published documents for all stages of the process can be found in the public CAA's Airspace Change portal (<u>link</u>).

Reference	Category (CAP1616)	Design Principle	Priority
DP1	Safety	Maintain or enhance current levels of safety.	1
DP2	Operational / Technical	Consider the requirements of all potential users.	2
DP3	Operational / Economic	Minimise the impact on other airspace users.	3
DP4	Policy / regulatory	Comply with UAS regulatory framework.	4
DP5	Operational / Technical	Operating area to be located over the sea.	5
DP6	Environmental / Operational	Minimise the noise and environmental impact on areas affected by the proposed change.	6

Approved Design Principles

Table 1: Approved Design Principles from Stage 1.

The Design Principle Assessment Criteria

Set out in table 2 below are the assessment criteria developed to enable the evaluation of the Design Options against the Design Principles. Table 2 summarises the assessment criteria used to determine whether each Design Option meets/ partially meets/ does not meet each Design Principle.

This assessment shows how each Design Option aligns with the Design Principles developed at Stage 1. The evidence is qualitative and based on combining input from experienced subject matter experts with feedback from stakeholders.







Reference	Design Principle	Priority	Assessment Criteria	Qualitative Criteria for Met, Partial, Not Met
DP1	Maintain or enhance current levels of safety.	1	Qualitative evaluation by subject matter experts, to consider if safety issues are likely to be present, and if so, their scale compared with Option 0 – the baseline.	MET: No safety issues identified, or issues can be overcome. PARTIAL: Issues identified that would require additional mitigations. NOT MET: Issues identified that are currently unable to be overcome without prohibitively restrictive safety mitigations.
DP2	Consider the requirements of all potential users.	2	Qualitative evaluation by subject matter experts of the impact on potential airspace users requirements, of the airspace design option.	MET: Expected to meet the overall majority of airspace users' requirements. PARTIAL: Expected to meet some of airspace users' requirements. NOT MET: Expected not to meet the overall majority of the airspace users' requirements.
DP3	Minimise the impact on other airspace users.	3	Qualitative evaluation by subject matter experts on the likelihood of the airspace design to impact on other airspace users.	MET: Expected not to limit airspaces access as a result of the airspace design. PARTIAL: Expected to limit access to airspace as a result of the airspace design. NOT MET: Expected to deny access to airspace as a result of the airspace design
DP4	Comply with UAS regulatory framework.	4	Qualitative evaluation by subject matter experts to consider regulatory	MET: Expected to comply fully, or mostly but with







			areas where compliance is mandatory.	reasonable justification for non-compliance. PARTIAL: Expected to comply partially, with significant justification needed for non- compliant areas. NOT MET: Significant areas of non-compliance.
DP5	Operating area to be located over the sea.	5	Qualitative evaluation by subject matter expert of the airspace design option and its geographic boundaries in relation to the sea and land.	MET: Airspace Design is located over the sea. PARTIAL: NOT MET: Airspace Design has 20% of the design of the airspace design located over land. NOT MET: Airspace Design has 10% of the design of the airspace design located over land.
DP6	Minimise the noise and environmental impact on areas affected by the proposed change.	6	Qualitative evaluation by subject matter experts to consider the likelihood of the airspace design to reduce, have similar, or increase noise impacts, and informed by stakeholder feedback. Qualitative evaluation by subject matter experts to consider the likelihood of the airspace design to reduce, have similar, or increase CO2 emissions, and informed by	MET: Has the potential to reduce overall impacts of aircraft noise. PARTIAL: Impacts of aircraft noise likely to be similar. NOT MET: Has the potential to increase the overall impacts of aircraft noise MET: Has the potential to reduce fuel burn per flight of activity to meet the statement of need. PARTIAL: May introduce no change (broadly similar to baseline).





	NOT MET: Clearly likely to increase fuel burn per flight of activity to meet the statement of need.
Qualitative evaluation by	MET: Has the potential to
subject matter experts to	reduce environmental
consider the likelihood of	impacts
the airspace design to	PARTIAL: Impacts of aircraft
reduce, have similar, or	environmental impacts likely
increase environmental	to be similar
impacts, and informed	NOT MET: Has the potential
by stakeholder feedback.	to increase the overall
	impacts on the environment.

Table 2: Design Principle Assessment Criteria.

The Design Principles were ranked by priority, with DP1 encompassing safety having the highest priority. Therefore, any Design Option which has not met this DP contains safety concerns and will be discounted at this stage of the evaluation.

DP4 encompasses compliance with relevant laws and regulations. If any Design Option has not met this DP, it will be discounted at this stage of the evaluation.

Regarding biodiversity impacts: All the design options considered as part of this airspace changes are unlikely to have an impact on biodiversity because they do not involve changes to ground based infrastructure and any attributed habitat disturbance. As a result of no such ground-based infrastructure changes being associated with this proposal, therefore this proposal is not predicted to impact biodiversity.





List of Airspace Design Options

Design Options	Description
Option 0 – Baseline / Do nothing	The airspace environment that existed prior to the existence of the Temporary Danger Area (TDA) complex EG D098, based on Class G airspace.
Option 1A – Permanent Danger Area, with DAAIS only.	A permanent danger area (DA) established in Class G airspace, within the Channel. The same volume of airspace as the totality of TDA EG D098 complex, both laterally and vertically, with some amendments to the individual Danger Areas that make up the complex. The option includes a DAAIS only.
Option 1B – Permanent Danger Area, with DAAIS and DACS.	A permanent DA established in Class G airspace, within the Channel. The same volume of airspace as the totality of TDA D098 complex, both laterally and vertically, with some amendments to the individual DA's that make up the complex (please see design section below). The option includes a DAAIS / DACS to allow greater permeability for low level GA crossing under certain conditions.
Option 2 – Permanent Danger Area with an access corridor.	A permanent DA established in Class G airspace, within the Channel. An increased volume of airspace over TDA D098 complex, due to vertical ceilings increased to 2500ft across the DA complex, with some amendments to the individual DA's that make up the complex (please see design section below). The option includes a DAAIS only.

Table 3: Comprehensive list of airspace options.

Design Principle Evaluation Summary

The table below summarises the Design Principle Evaluation within Annex A.







Reference	Design Principle	Priority	Option 0	Option 1A	Option 1B	Option 2
DP1	Maintain or enhance current levels of safety.	1	Discounted	PARTIAL	MET	Discounted
DP2	Consider the requirements of all potential users.	2	N/A	PARTIAL	MET	N/A
DP3	Minimise the impact on other airspace users.	3	N/A	NOT MET	PARTIAL	N/A
DP4	Comply with UAS regulatory framework.	4	N/A	MET	MET	N/A
DP5	Operating area to be located over the sea.	5	N/A	MET	MET	N/A
DP6	Minimise the noise and environmental impact on areas affected by the proposed change.	6	N/A	MET	MET	N/A

Options Progressing to Stage 2B

Option 0 and Option 2 were discounted as part of the Design Principle Evaluation on Safety and Legal / Regulator grounds. As such Options 1A and Option B will be accepted and taken forward to Stage 2B.

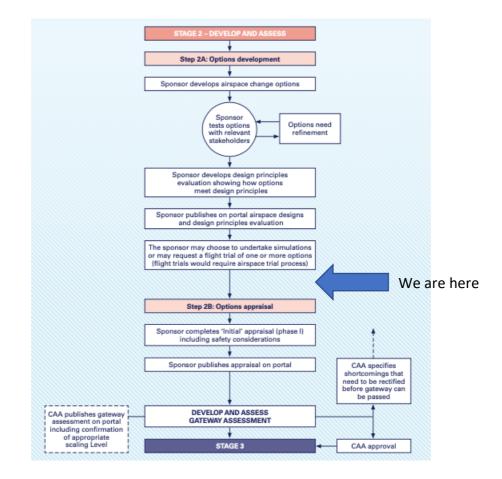
Next Steps

This document has been submitted to the CAA and published on the airspace change portal as part of the airspace change process.





Once Stage 2A has been complete we will move to Stage 2B – initial options appraisal. In Stage 2B each possible option, even if there is only one, is assessed to understand the impact, both positive and negative. The change sponsor carries out the options appraisal against requirements set by the CAA in an iterative approach: the Initial appraisal is the first of three appraisal phases. These will be uploaded to the ACP online portal prior to the CAA Develop & Assess Gateway currently scheduled for the 28 April 23.









Annex A - Design Principle Evaluation

Option 0 – Baseline (Do Nothing)		REJE	REJECTED	
Description: The airspace environment that existed prior to the existence of the Temporary Danger Are	a (TDA) complex EG D098, b	ased on Class G a	airspace.	
Design Principle:	NOT MET	PARTIAL	MET	
DP 1 - Maintain or enhance current levels of safety.				
DP 1 - Maintain or enhance current levels of safety. Summary of qualitative assessment:				
	s do not have a Detect and A n CAP 722, UAS are required	void capability, e to be segregated	nabling them I from	
Summary of qualitative assessment: The baseline option is based on Class G airspace with no segregation of manned and uncre regulatory stand point with the current technology as the deployed Uncrewed Air Systems to identify and take avoiding action of other aircraft. For this and other reasons detailed i	do not have a Detect and A n CAP 722, UAS are required g stage 2 during the developr	void capability, e to be segregated nent of the airsp	nabling them I from	
Summary of qualitative assessment: The baseline option is based on Class G airspace with no segregation of manned and uncre regulatory stand point with the current technology as the deployed Uncrewed Air Systems to identify and take avoiding action of other aircraft. For this and other reasons detailed i manned aircraft. This view has been supported in general by stakeholders engaged during	do not have a Detect and Aven CAP 722, UAS are required stage 2 during the developr restrictive safety mitigation	void capability, e to be segregated nent of the airsp s.	nabling them I from	







DP 2 - Consider the requirements of all potential users.			
Summary of qualitative assessment:			
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation co	nducted.		
Design Principle:	NOT MET	PARTIAL	MET
DP 3 - Minimise the impact on other airspace users.			
Summary of qualitative assessment:		I	
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation co	nducted.		
Design Principle:	NOT MET	PARTIAL	MET
DP 4 - Comply with UAS regulatory framework.			
Summary of qualitative assessment:	1	1	L
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation co	nducted.		







Design Principle:	NOT MET	PARTIAL	MET	
DP 5 - Operating area to be located over the sea.				
Summary of qualitative assessment:				
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation conducted.				
Design Principle:	NOT MET	PARTIAL	MET	
DP 6 - Minimise the noise and environmental impact on areas affected by the proposed change.				
Summary of qualitative assessment:				
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation co	nducted.			







Option 1A – Permanent Danger Area with DAAIS only.			ACCEPTED	
Description: A permanent danger area (DA) established in Class G airspace, within the Channel. The same volume the totality of TDA EG D098 complex, both laterally and vertically, with some amendments to the indi Areas that make up the complex. This option includes a DAAIS only.				
Design Principle:	NOT MET	PARTIAL	MET	
DP 1 - Maintain or enhance current levels of safety.				
Summary of qualitative assessment:				
Option 1A is based on Class G airspace with a permanent Danger Area segregating manned and uncreative accepted means of ensuring the safe operation UAS within segregated airspace. In some circumstance VFR traffic, should conditions deteriorate, and due to the significant lateral and vertical dimensions of descend and detour around the danger area or turn back. This view has been supported in general by during the development of the airspace options.	es a reduction in s the airspace, VFF	safety could mat R pilots would ne	erialise for ed to either	







PARTIAL: Issues identified that would require additional mitigations.			
Design Principle:	NOT MET	PARTIAL	MET
DP 2 - Consider the requirements of all potential users.			
Summary of qualitative assessment:			
The establishment of a permanent Danger Area with only a DAAIS, removes access to the airspace wir does not meet the requirements of other air traffic without access to the Danger Area. Due to the lat this will continue to impact air traffic both crossing the channel and routing along the south coast, at The design however does take into consideration the requirements of HMG contracted UAS operator approved statement of need. PARTIAL: Expected to meet some of airspace users' requirements.	eral and vertical call	limensions of the 1500ft and 250	e Danger Area Oft in places.
Design Principle:	NOT MET	PARTIAL	MET
DP 3 - Minimise the impact on other airspace users.			







The establishment of a permanent Danger Area with only a DAAIS, removes access to the airspace within the danger area when active, and therefore does not minimise the impact on other air traffic without access to the Danger Area. The lateral and vertical dimensions of the Danger Area may have a negative impact on air traffic both crossing the channel and routing along the south coast, at altitudes less than 1500ft and 2500ft in places. The design however does take into consideration the impact of HMG contracted UAS operators, undertaking operational activity to meet the approved statement of need, who would not be able to operate without a Danger Area.

NOT MET: Expected to deny access to airspace as a result of the airspace design

Design Principle:	NOT MET	PARTIAL	MET
DP 4 - Comply with UAS regulatory framework.			

Summary of qualitative assessment:

Para 2.1.2 of CAP 722 Beyond visual line of sight operations (BVLOS) states: Unmanned aircraft intended for BVLOS operations will require either:

- A block of airspace to operate in which the unmanned aircraft is 'segregated' from other aircraft because other aircraft are not permitted to enter this airspace block, the unmanned aircraft can operate without the risk of collision, or the need for other collision avoidance capabilities; or
- 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. This is referred to as a Detect and Avoid (DAA) capability. Further details regarding DAA can be found at 3.6; Note: Any







DAA capability would be expected to ensure compliance with Regulation (EU) 923/2012 the Standardised European Rules of the Air (SERA) chapter 2 (avoidance of collisions), as adjusted by Rule 8 of the Rules of the Air Regulations 2015 (Rules for avoiding aerial collisions);

No CAA approved detect and avoid capability that complies with Regulation (EU) 923/2012 the Standardised European Rules of the Air (SERA) chapter 2 (avoidance of collisions), as adjusted by Rule 8 of the Rules of the Air Regulations 2015 (Rules for avoiding aerial collisions), current exists nor forecast within the lifespan of this ACP.

At the current time the requirement is for a segregated airspace environment to enable Beyond Visual Line of Sight UAS operations, as no detect and avoid capability has been approved by the CAA to enable a non-segregated airspace (Class G) option; therefore the segregated airspace established by a Permanent Danger Area complies with current UAS regulatory framework.

MET: Expected to comply fully, or mostly but with reasonable justification for non-compliance.

Design Principle:	NOT MET	PARTIAL	MET
DP 5 - Operating area to be located over the sea.			
Summary of qualitative assessment:	1		
The lateral dimensions of the permanent Danger Area are located over the sea.			
MET: Airspace Design is located over the sea.			







Design Principle:	NOT MET	PARTIAL	MET
DP 6 - Minimise the noise and environmental impact on areas affected by the proposed change.			
Summary of qualitative assessment:			
The likelihood is that the airspace design will in general assist to reduce noise impacts, due to UAS act conducted to meet the statement of need. This is due to the noise signature of the UAS being less that			activity being
MET: Has the potential to reduce overall impacts of aircraft noise.			
The likelihood is that the airspace design will in general assist to reduce CO2 emissions, due to UAS ac conducted to meet the statement of need. This is due to the vast reduction in fuel burn per hour of fl the aircraft.	, , ,		
MET: Has the potential to reduce fuel burn per flight of activity to meet the statement of need.			
The likelihood is that the airspace design will in general assist to reduce environmental impacts, due t activity being conducted to meet the statement of need. This is due to the environmental impacts of equivalents.		-	
MET: Has the potential to reduce environmental impacts.			







Option 1B – Permanent Danger Area, with DAAIS and DACS.			ACCEPTED	
Description: A permanent DA established in Class G airspace, within the Channel. The same volume of airspace as TDA D098 complex, both laterally and vertically, with some amendments to the individual DA's that m complex (please see design section below). The option includes a DAAIS / DACS to allow greater perm low level GA crossing under certain conditions.	nake up the		200 m 100 m 100 m	
Design Principle:	NOT MET	PARTIAL	MET	
DP 1 - Maintain or enhance current levels of safety.				
Summary of qualitative assessment:	1	1		
Option 1B is based on Class G airspace with a permanent Danger Area segregating crewed and uncreve accepted means of ensuring the safe operation of BVLOS UAS. The DAAIS and DACS airspace manage Danger Area should conditions deteriorate, and VFR pilots need to descend to maintain visibility, rath area or turn back. This view has been supported in general by VFR pilot stakeholders and ATSU stake	ment, will enable er than having to	VFR traffic to tra detour around t	ansit the he danger	

development of the airspace options.







Design Principle:	NOT MET	MET	
DP 2 - Consider the requirements of all potential users.			
Summary of qualitative assessment:			
With the introduction of a DAAIS and DACS as part of this design option this takes into consideration airspace segregated by Permanent Danger Area. This will enable other air traffic to transit the Dange efficiently whilst also enabling UAS operations to meet the approved statement of need.	-		
MET: Expected to meet the overall majority of airspace users' requirements.			
Design Principle:	NOT MET	PARTIAL	MET
DP 3 - Minimise the impact on other airspace users.			
Summary of qualitative assessment:			







Danger Area this impact is being minimised at every stage, whilst taking into consideration the impact undertaking operational activity to meet the approved statement of need, who would not be able to d		-	s,
PARTIAL: Expected to limit access to airspace as a result of the airspace design.			
Design Principle:	NOT MET	PARTIAL	MET
DP 4 - Comply with UAS regulatory framework.			
Summary of qualitative assessment:			
Para 2.1.2 of CAP 722 Beyond visual line of sight operations (BVLOS) states: Unmanned aircraft intenc	led for BVLOS ope	erations will requi	re either:
• A block of airspace to operate in which the unmanned aircraft is 'segregated' from other aircra enter this airspace block, the unmanned aircraft can operate without the risk of collision, or the or	-	-	
• A technical capability which has been accepted as being at least equivalent to the ability of a p potential conflictions. This is referred to as a Detect and Avoid (DAA) capability. Further details	-	-	







No CAA approved detect and avoid capability that complies with Regulation (EU) 923/2012 the Standardised European Rules of the Air (SERA) chapter 2 (avoidance of collisions), as adjusted by Rule 8 of the Rules of the Air Regulations 2015 (Rules for avoiding aerial collisions), current exists nor forecast within the lifespan of this ACP.

At the current time the requirement is for a segregated airspace environment to enable Beyond Visual Line of Sight UAS operations, as no detect and avoid capability has been approved by the CAA to enable a non-segregated airspace (Class G) option; therefore the segregated airspace established by a Permanent Danger Area complies with current UAS regulatory framework.

MET: Expected to comply fully, or mostly but with reasonable justification for non-compliance.

Design Principle:	NOT MET	PARTIAL	MET
DP 5 - Operating area to be located over the sea.			
Summary of qualitative assessment:			
The lateral dimensions of the permanent Danger Area are located over the sea.			
MET: Airspace Design is located over the sea.			
Design Principle:	NOT MET	PARTIAL	MET
DP 6 - Minimise the noise and environmental impact on areas affected by the proposed change.			







The likelihood is that the airspace design will in general assist to reduce noise impacts, due to UAS activity displacing manned aviation activity being conducted to meet the statement of need. This is due to the noise signature of the UAS being less than manned equivalents.

MET: Has the potential to reduce overall impacts of aircraft noise.

The likelihood is that the airspace design will in general assist to reduce CO2 emissions, due to UAS activity displacing manned aviation activity being conducted to meet the statement of need. This is due to the vast reduction in fuel burn per hour of flight, achieved due to the difference in size of the aircraft.

MET: Has the potential to reduce fuel burn per flight of activity to meet the statement of need.

The likelihood is that the airspace design will in general assist to reduce environmental impacts, due to UAS activity displacing manned aviation activity being conducted to meet the statement of need. This is due to the environmental impacts of the UAS being significantly less than manned equivalents.

MET: Has the potential to reduce environmental impacts.







Option 2 – Permanent Danger Area with an access corridor.			CTED
Description: A permanent DA established in Class G airspace, within the Channel. An increased volume of airspace TDA D098 complex, due to vertical ceilings increased to 2500ft across the DA complex, with some amendments to the individual DA's that make up the complex (please see design section below). The includes a DAAIS only.		000 N	
Design Principle: DP 1 - Maintain or enhance current levels of safety.	NOT MET	PARTIAL	MET







This option sets out a Danger Area with corridors for traffic to route though, thereby enabling the transit of other air users through the Danger Area. During Stage 2 engagement a significant number of stakeholders raised safety concerns based on the potential for funnelling, complex nature of the airspace structures involved, the potential for UAS to be operating above transiting aircraft and the ability of Search and Rescue aircraft to access incidents due to corridors.

NOT MET: Issues identified that are currently unable to be overcome without prohibitively restrictive safety mitigations.

This option has been discounted at this stage as it does not meet DP 1, as set out within the Design Principle Assessment Criteria.

Design Principle:	NOT MET	PARTIAL	MET	
DP 2 - Consider the requirements of all potential users.				
Summary of qualitative assessment:				
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation conducted.				
Design Principle:	NOT MET	PARTIAL	MET	
DP 3 - Minimise the impact on other airspace users.				







Summary of qualitative assessment:			
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation cor	nducted.		
Design Principle:	NOT MET	PARTIAL	MET
DP 4 - Comply with UAS regulatory framework.			
Summary of qualitative assessment:			
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation cor	nducted.		
Design Principle:	NOT MET	PARTIAL	MET
DP 5 - Operating area to be located over the sea.			
Summary of qualitative assessment:			
N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation cor	nducted.		
Design Principle:	NOT MET	PARTIAL	MET
DP 6 - Minimise the noise and environmental impact on areas affected by the proposed change.			







N/A – Due to Not Met at DP1 (Highest priority – safety) Stage, and therefore no further evaluation conducted.

