Free Route Airspace Deployment 4

Gateway documentation:
Stage 1 Define

Step 1B Design Principles
Stakeholder Engagement Feedback

Action	Role	Date
Produced	**Airspace Change Specialist** NATS Airspace and Future Operations	02/12/2021
Reviewed Approved	**Head of Airspace Change Compliance and Delivery** NATS Airspace and Future Operations	02/12/2021
Reviewed Approved	**Airspace Evolution Manager** NATS Airspace and Future Operations	02/12/2021
Reviewed Approved	**FRA Project Manager L6269** Operations & Airspace Programme Delivery	02/12/2021

Publication history

Issue	Month/Year	Changes this issue
1.0	Dec 2021	Submitted to CAA (Stage 1 Gateway)
1.1	Dec 2021	Section 2: Stakeholder engagement detail added

Contents

1. Introduction

This document forms part of the document requirements for CAP1616 Airspace Change Process (ACP), Stage 1 Define Gateway, Step 1B Design Principles. This document may be read in conjunction with Stage 1A documentation and the Statement of Need available from the Airspace Change Portal.

NATS are currently in the process of proposing airspace changes to implement Free Route Airspace (FRA) within high altitude airspace across the UK, as mandated by European Law. UK FRA is being introduced in a phased manner, split into four deployments within the UK airspace. This plan was developed in alliance with neighbouring Air Navigation Service Providers. Each phased deployment of FRA is being progressed as an individual ACP under CAP1616, and each is therefore following similar (parallel) workstreams.

This workstream relates to FRA Deployments 3 (D3) and 4 (D4) (see Figure 1). Given the extensive engagement undertaken for Deployments 1 and 2, and similarities with previous FRA deployments, engagement and consultation activities for deployments D3 and D4 will be run simultaneously, to minimise impact on stakeholders. Separate ACPs are being submitted for each deployment.

This ACP relates to FRA Deployment 4 (D4).

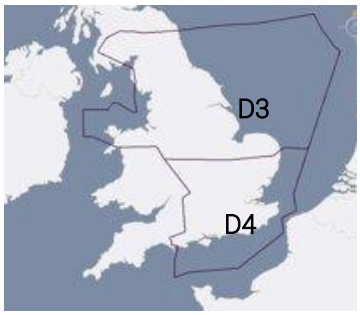


Figure 1 Deployment Areas D3 & D4

2. Design Principle Development:

In October 2018, NATS distributed draft design principles relating to Free Route Airspace for Deployment 1 (D1), for feedback & comment, along with some context as to the purpose of the design principles. We emailed them to industry stakeholders, to engage with them and enable us to understand the design considerations that are important to them. During the same period meetings with several key stakeholders took place.

We made it clear that these proposed draft design principles were for discussion, and that we would welcome feedback. We received responses and input from several stakeholders which influenced the final design principles which were published in the FRA D1 ACP. Further detail and evidence of this engagement activity and the development of the design principles is presented in the D1 Stage 1B document.

For Deployment 2 (D2), due to the high-level nature of the change, the fact that elements of FRA implementation are mandated within European (now UK) Law[1], and to ensure consistency in the UK high-level airspace design, the same set of Design Principles developed for FRA D1 were engaged upon with relevant stakeholders, many of whom had been involved in the Design Principle development of FRA D1. The final design principles for D2 are presented in the D2 Stage 1B document.

NATS has developed a comprehensive list of stakeholders with whom valuable engagement work has been undertaken as the FRA programme has developed. Deployments D3 and D4 continue to build upon the previous engagement with stakeholders and utilise the Design Principles developed for D2 as the draft Design Principles to engage upon.

NATS considered that it was appropriate to engage with the full list of stakeholders identified during the latter stages of D1 and D2 for D3 and D4 Design Principles development and in line with the guidance provided in

[1] [1] The implementation of FRA by European Union (EU) member states was mandated in European law under the EU Implementing Regulation EU716/2014 (Pilot Common Project)_ EU716/2014 has been superseded by EU2021/116 (Common Project 1) within the EU. This change to the regulation occurred post-UK withdrawal from the EU and the DfT have consulted on if and how to incorporate this into UK law, at the time of writing, a decision has not been published. EU716/2014 is retained (and amended in UK domestic law) under the European Union (Withdrawal) Act 2018[1] (referred to as 'the mandate' throughout this document).

CAP1616 the stakeholder list was reviewed and engagement activity was undertaken to include directly affected local aviation stakeholders (airspace users, ANSPs, airports), relevant members of NATMAC, and relevant aviation/non-aviation organisations likely to be impacted. These stakeholders have provided valuable feedback and are engaged with the FRA programme, so it was deemed pertinent to continue to engage with them at this stage to keep them informed of the development of D3 & D4.

The draft Design Principles were distributed via email[2] to stakeholders for feedback and comment, along with some context as to the purpose behind them, with a 2-week response turnaround period. As the Design Principles and FRA concept are familiar to these stakeholders, NATS deemed this to be a reasonable period for this Stage; no requests for an extension were received. After 10 days a reminder email was sent to those who had not responded (see page 12 for further details).

Furthermore, NATS was keen to reduce stakeholder fatigue, given the feedback already received from stakeholders throughout D1 and the Consultation for D2 was simultaneously taking place.

This engagement with stakeholders enables NATS to understand the design considerations which are important to them.

The relative priorities for each Design Principle (A – highest, C - lowest) are identified and indicated in Section 3 next to each.

Engagement on specific design concepts/options will happen in Stage 2, and formal consultation in Stage 3. The design concepts will be evaluated against the final design principles as presented herein.

3. How this document is laid out

The Executive Summary lists the Design Principles (DPs) which have been supported by stakeholders.

The next sections discuss each DP in turn. In accordance with recommended engagement/consultation practice[3] this is structured as follows:

We asked	The original discussion text of each draft DP (we sent this out, stakeholders provided feedback)
You said	A summary of how feedback has influenced the DP
We did	Amended final DP (unless original was agreed upon)

This is repeated for each DP.

Section 6 summarises the engagement activity, numbers of responses and key stakeholders who were included in the engagement.

[2] To minimise stakeholder engagement fatigue (particularly since the D3 & D4 Stage 1 engagement was running concurrently with the D2 consultation period) NATS considers it proportional to limit stakeholder engagement regarding design principles activities to targeted emails only.
[3] Recommended by the Consultation Institute

4. Executive Summary – List of Design Principles (DP)

The following list summarises the final Design Principles which have resulted from engagement with our stakeholders. Each of these principles evolved from the FRA D2 DP engagement feedback. Priorities are indicated in brackets (A being the highest priority). These priorities will be considered when the design principles are used to evaluate/rank design options in the later stages of the airspace change process. How the DPs have evolved is described in detail in the next sections of the document.

No	Design Principle	Priority	Category	Notes
0	Maintain or enhance current levels of safety.	A	Safety	
1	The proposed airspace will maintain or enhance operational resilience of the ATC network.	B	Operational (Resilience)	
2	The proposed FRA airspace will facilitate optimised network economic performance.	B	Economic (Network Performance)	
3	The proposed FRA airspace will facilitate the reduction of CO_2 emissions per flight	B	Environmental (CO_2e emissions)	
4	Minimise environmental impacts to stakeholders on the ground	C	Environmental (Impact to Stakeholders on the Ground)	*Due to the altitude of the proposed changes (>25,000ft), it is not expected that there will be any significant environmental impacts to stakeholders on the ground due to noise, visual intrusion or local air quality. . However this DP acknowledges that environmental impacts (e.g. noise and tranquillity) can still be a consideration even at high altitudes.*
5	Create an environment within which AOs may freely flight plan optimised trajectories between defined entry and exit points.	B	Operational (Optimised Trajectories)	
6	The interface between FRA and the ATS route network will be optimised for safety.	A	Technical (Interface)	
7	The interface between FRA and the ATS route network will maintain or improve flight efficiency compared to current day operations.	B	Technical (Flight Efficiency)	
8	The FRA airspace will be compatible with the requirements of the MoD and take into consideration the requirements of defence industry stakeholders.	B	Technical (MoD Requirements)	
9	The impacts on GA and other civilian airspace users due to FRA will be minimised.	B	Technical (GA Impacts)	
10	The proposed FRA airspace will fulfil the requirements of the AMS (CAP1711).	A	Policy (AMS)	

11	The proposed FRA airspace will be suitable for introduction in a phased implementation.	B	Implementation (Phasing)	
12	Connectivity to adjacent airspace (FRA or non-FRA) will be maintained or enhanced.	B	Operational (Adjacent ANSPs)	
13	FRA will maintain current ATC capacity, and will aim to maximise airspace capacity.	B	Operational (Capacity)	
14	The proposed FRA airspace will be compatible with the Flexible Use Airspace (FUA) concept.	B	Operational (Flexible Use Airspace)	

5. Airspace Design Principles: Feedback and Evaluation

5.1 DP0 Safety

Original discussion text

Maintain or enhance current levels of safety.

Feedback Summary & Priority:

NATS did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority A assigned, since safety is the highest priority.

5.2 DP1 Operational (Resilience)

Original discussion text

The proposed airspace will maintain or enhance operational resilience of the ATC network.

Feedback Summary & Priority:

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle Comment Deployment 4: Upstream impact for Shannon En route Sectors of interest for traffic delivery as this project progresses	No change to the DP NATS will be further engaging with the IAA at Stage 2 & 3 as we seek to develop design options for both deployments.

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since resilience is high priority.

5.3 DP2 Economic (Network Performance)

Original discussion text

The proposed FRA airspace will facilitate optimised network economic performance

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle Comment: As part of Cross-border FRA, these projects have potential to deliver significant network economic performance. However, this is dependent on full FRA deployment rather than FRA with systemised (FRA) routing as seen in UK FRA Dep 2 and possible associated RADs, which may potentially impact upstream and downstream ACCs/FIRs	No change to the DP NATS will be further engaging with the IAA at Stage 2 & 3 as we seek to develop design options for both deployments.

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since Network Performance is high priority.

5.4 DP3 Environmental (CO2 Emissions)

Original discussion text

The proposed FRA airspace will facilitate the reduction of CO_2 emissions per flight in line with UK Government strategy to become Net Zero by 2050.

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle Comment: Adjacent ACCs/FIRs have equally onerous environmental deliverables and the IAA ANSP will request "network" data on environmental performance, as these deployments progress	No change to the DP Comment acknowledged

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since reduction of CO_2 Emissions is high priority.

5.5 DP4 Environmental (Impact to Stakeholders on the Ground)

Original discussion text

Minimise environmental impacts to stakeholders on the ground

(note: due to the altitude of the proposed changes (>20,000ft), it is not expected that there will be any significant environmental impacts to stakeholders on the ground due to noise, visual intrusion and local air quality)

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle Comment/ Question: Does this equally apply to adjacent FIR airports, specifically EIDW which is proximate to FRA Dep 3 airspace?	No change to the DP NATS will be engaging with the IAA further to develop and agree designs, but the Design Principles are relevant to the FIR boundary.

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority C assigned, since impacts to stakeholders on the ground due to high level overflights, would be considered, and may influence the design, if all other higher priority DP factors were equal.

5.6 DP5 Operational (Optimised Trajectories)

Original discussion text

Create an environment within which AOs may freely flight plan optimised trajectories between defined entry and exit points.

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle Comment: The IAA ANSP will request a broader definition of Entry/Exit in the context of Cross-border FRA which is a core principle of trajectory optimisation	No change to the DP Acknowledged.

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since facilitating optimised trajectories is high priority.

5.7 DP6 Technical (Interface Safety)

Original discussion text

The interface between FRA and the ATS route network will be optimised for safety.

Feedback Summary & Priority:

NATS did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority A assigned, since safety is the highest priority.

5.8 DP7 Technical (Interface Flight Efficiency)

Original discussion text

The interface between FRA and the ATS route network will maintain or improve flight efficiency compared to current day operations.

Feedback Summary & Priority:

NATS did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned since flight efficiency is high priority.

5.9 DP8 Technical (MoD Requirements)

Original discussion text

The FRA airspace will be compatible with the requirements of the MoD and take into consideration the requirements of defence industry stakeholders.

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle Comment: (MoD) Interfaces with Shannon FIR/UIR of concern in a FUA context and underpinned by cross-border FRA	No change to the DP NATS will be further engaging with the IAA at Stage 2 & 3 as we seek to develop design options for both deployments.

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since MOD requirements are high priority.

5.10 DP9 Technical (GA Impacts)

Original discussion text

The impacts on GA and other civilian airspace users due to FRA will be minimised.

Feedback Summary & Priority:

NATS did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since minimising impacts on GA is high priority.

5.11 DP10 Policy (AMS)

Original discussion text

The proposed FRA airspace will fulfil the requirements of the AMS (CAP1711).

Feedback Summary & Priority:

NATS did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority A assigned, since the AMS requirements state what airspace modernisation must deliver.

5.12 DP11 Implementation (Phasing)

Original discussion text

The proposed FRA airspace will be suitable for introduction in a phased implementation.

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle Comment: We note that a phased implementation is necessary as outlined. However, the full rollout of FRA for each deployment, with no more than initial traffic management measures/ STAMs, would be a concern for the IAA ANSP should longer-term measures be considered or needed as part of each deployment	No change to the DP NATS will be further engaging with the IAA as we seek to develop and implement both deployments.

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed.
Priority B assigned, since a phased implementation is important to facilitating an orderly transition to FRA.

5.13 DP12 Operational - (Adjacent ANSPs)

Original discussion text

Connectivity to adjacent airspace (FRA or non-FRA) will be maintained or enhanced.

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed. Comment: This is of key interest for the IAA ANSP and indeed an expected output would be longer-range FRA DCT for upper airspaces. As part of design principles, the IAA ANSP preference would involve a fuller examination of the inter-ANSP interfaces, with a clearer definition of Entry/Exit/Intermediate FRA waypoints key and most especially in the context of cross-border FRA	No change to the DP NATS will be engaging with the IAA at Stage 2 & 3 where this detail can be considered at part of the design option development.

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since efficient connectivity with adjacent ANSPs' airspace is high priority.

5.14 DP13 Operational - (Capacity)

FRA will maintain current ATC capacity, and will aim to maximise airspace capacity.

Feedback Summary & Priority:

NATS did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since maintaining airspace capacity is high priority.

5.15 DP14 Operational (Flexible Use Airspace)

The proposed FRA airspace will be compatible with the Flexible Use Airspace (FUA) concept.

Stakeholder	Comment	NATS' response
IAA ANSP	Agreed in principle. Comment: It should be noted that currently FUA applies across the UK-IRL FAB and may have broader implications than this design principle reflects	No change to the DP Acknowledged.

Feedback Summary & Priority:

While NATS did receive feedback on this DP, we did not receive any feedback on the wording or priority of this DP. The wording will remain as proposed. Priority B assigned, since maintaining flexible use of airspace is high priority.

6. Engagement Evidence

A significant amount of engagement was undertaken in the development of these Design Principles for FRA D1 & D2, which for consistency of design throughout UK high-level airspace, have been used as the draft design principles for FRA D3 & D4. This is described and referenced in the D1 Stage 1B Design Principles documents in section 2 referenced above.

We received no design principle feedback from stakeholders for FRA D3/D4, with responses being content with the draft design principles. Table 1 below provides a summary of the engagement activity for FRA D4. Evidence is provided as an Annex where relevant.

6.1 We Asked - Emails to relevant aviation industry interested parties

Emails were sent on 18 November 2021 to 159 organisations with the draft Design Principles. This included National Air Traffic Management Advisory Committee (NATMAC) contacts, adjacent ANSPs, relevant airlines, airports and data houses. A return date of 1 December was set, giving stakeholders two weeks to consider and respond, which is considered proportionate for feedback on Design Principles. A reminder email was sent on 29 November to those who had not responded. Table 1 identifies all those contacted.

6.2 You Said – Stakeholder Responses

20 stakeholders responded to the request for feedback on the DPs. These can be seen in Table 1.

All stated that they approve the draft design principles. One stakeholder provided comments, which are more relevant to Stage 2 & 3 of the ACP process. These can be seen in Annex C.

6.3 We Did

As no substantive comments or suggestions requiring change to Design Principles, the draft Design Principles will become the Final Design Principles which NATS will use for this airspace change.

6.4 Free Route Airspace Deployment 4 stakeholders Engagement Record

Table 1: FRA Deployment 3 & 4 Design Principle Engagement Record

Type	Company	Initial Email	Reminder Email	Response
AIRLINE	Aurigny Air	18/11/2021	29/11/2021	
AIRLINE	Aer Lingus	18/11/2021	29/11/2021	
AIRLINE	Air Canada	18/11/2021	29/11/2021	
AIRLINE	Air France	18/11/2021	29/11/2021	
AIRLINE	Air New Zealand	18/11/2021	29/11/2021	
AIRLINE	Air Transat	18/11/2021	29/11/2021	
AIRLINE	AirTanker Services Ltd	18/11/2021	29/11/2021	
AIRLINE	American Airlines	18/11/2021	29/11/2021	
AIRLINE	Austrian Airlines	18/11/2021	29/11/2021	
AIRLINE	Azerbaijan Airlines	18/11/2021	29/11/2021	
AIRLINE	BA CityFlyer	18/11/2021	29/11/2021	
AIRLINE	British Airways PLC	18/11/2021	29/11/2021	
AIRLINE	Cargolux Airlines International S.A	18/11/2021	29/11/2021	
AIRLINE	CityJet	18/11/2021	29/11/2021	
AIRLINE	Delta Air Lines	18/11/2021	29/11/2021	Approved 30/11/2021
AIRLINE	DHL Air Limited	18/11/2021	29/11/2021	
AIRLINE	Eastern Airways	18/11/2021	29/11/2021	
AIRLINE	easyJet Airline Company Ltd	18/11/2021	29/11/2021	

AIRLINE	Emirates Airlines	18/11/2021	29/11/2021	
AIRLINE	Etihad Airways	18/11/2021	29/11/2021	
AIRLINE	FedEx	18/11/2021	29/11/2021	
AIRLINE	Finnair Plc	18/11/2021	29/11/2021	
AIRLINE	GAMA Aviation	18/11/2021	29/11/2021	
AIRLINE	Germanwings	18/11/2021	29/11/2021	
AIRLINE	Iberia Airlines	18/11/2021	29/11/2021	
AIRLINE	Icelandair	18/11/2021	29/11/2021	
AIRLINE	Jet2.com	18/11/2021	29/11/2021	
AIRLINE	JetBlue	18/11/2021	29/11/2021	
AIRLINE	KLM Royal Dutch Airlines	18/11/2021	29/11/2021	
AIRLINE	Loganair Ltd	18/11/2021	29/11/2021	
AIRLINE	Lufthansa	18/11/2021	29/11/2021	
AIRLINE	Lufthansa Cargo	18/11/2021	29/11/2021	
AIRLINE	Malaysia Airlines	18/11/2021	29/11/2021	
AIRLINE	NetJets	18/11/2021	29/11/2021	
AIRLINE	Norwegian Air International	18/11/2021	29/11/2021	
AIRLINE	NOVAIR	18/11/2021	29/11/2021	
AIRLINE	Qatar Airways	18/11/2021	29/11/2021	
AIRLINE	Qantas	18/11/2021	29/11/2021	
AIRLINE	Ryanair	18/11/2021	29/11/2021	
AIRLINE	Saudi Arabian Airlines	18/11/2021	29/11/2021	
AIRLINE	Scandinavian Airlines - SAS	18/11/2021	29/11/2021	
AIRLINE	Scandinavian Airlines - SAS - Ireland	18/11/2021	29/11/2021	
AIRLINE	Singapore Airlines Ltd	18/11/2021	29/11/2021	
AIRLINE	Swiss	18/11/2021	29/11/2021	
AIRLINE	TAG Aviation (UK) Ltd	18/11/2021	29/11/2021	
AIRLINE	TAP	18/11/2021	29/11/2021	
AIRLINE	Titan Airways	18/11/2021	29/11/2021	
AIRLINE	TUI Airways	18/11/2021	29/11/2021	
AIRLINE	Turkish Airlines	18/11/2021	29/11/2021	
AIRLINE	United Airlines Inc.	18/11/2021	29/11/2021	
AIRLINE	UPS Airlines	18/11/2021	29/11/2021	
AIRLINE	Virgin Atlantic Airways Ltd	18/11/2021	29/11/2021	
AIRLINE	WestJet	18/11/2021	29/11/2021	
AIRLINE	Wizz Air Hungary Ltd	18/11/2021	29/11/2021	
AIRLINE	Wizz Air UK	18/11/2021	29/11/2021	
AIRLINE	Flybe	18/11/2021	29/11/2021	
ANSP	DSNA (France)	18/11/2021	29/11/2021	
ANSP	DSNA (Brest)	18/11/2021	29/11/2021	
ANSP	DSNA (Reims)	18/11/2021	29/11/2021	
ANSP	DSNA (Paris)	18/11/2021	29/11/2021	
ANSP	MUAC	18/11/2021	29/11/2021	Approved 29/11/2021
ANSP	Eurocontrol CFMU	18/11/2021	29/11/2021	
ANSP	78 Squadron	18/11/2021	29/11/2021	Response via DAATM
ANSP	Fintraffic ANS	18/11/2021	29/11/2021	
ANSP	Avinor (Norway)	18/11/2021	29/11/2021	Approved 29/11/2021
ANSP	EANS (Estonia)	18/11/2021	29/11/2021	

ANSP	Eurocontrol	18/11/2021	29/11/2021	Approved 29/11/2021
ANSP	Isavia ANS (Iceland)	18/11/2021	29/11/2021	
ANSP	LGS (Latvia)	18/11/2021	29/11/2021	
ANSP	LFV (Sweden)	18/11/2021	29/11/2021	Approved 30/11/2021
ANSP	NAVIAIR	18/11/2021	29/11/2021	Approved 29/11/2021
ANSP	Borealis Alliance Executive	18/11/2021	29/11/2021	
ANSP	Irish Aviation Authority	18/11/2021	29/11/2021	Approved 30/11/2021 (with comments – see Annex C)
CSFP	Air Support	18/11/2021	29/11/2021	
CSFP	Aviation Cloud	18/11/2021	29/11/2021	
CSFP	Flight Keys	18/11/2021	29/11/2021	
CSFP	Lido	18/11/2021	29/11/2021	
CSFP	Jeppesen	18/11/2021	29/11/2021	
CSFP	Lufthansa Systems	18/11/2021	29/11/2021	
CSFP	NavBlue	18/11/2021	29/11/2021	
CSFP	Sabre	18/11/2021	29/11/2021	
NATMAC	Airlines UK	18/11/2021	29/11/2021	
NATMAC	Airspace4all	18/11/2021	29/11/2021	
NATMAC	AEF (Aviation Envt Federation)	18/11/2021	29/11/2021	
NATMAC	AOA (Airline Operators Asc)	18/11/2021	29/11/2021	
NATMAC	AOPA (Aircraft Owners and Pilots Association)	18/11/2021	29/11/2021	
NATMAC	ARPAS-UK	18/11/2021		Approved 24/11/2021
NATMAC	BAE Systems	18/11/2021	29/11/2021	
NATMAC	BALPA (British airline pilots association)	18/11/2021	29/11/2021	
NATMAC	BBAC (British Balloon and Airship Club)	18/11/2021	29/11/2021	
NATMAC	BBGA (British Buisness and GA)	18/11/2021	29/11/2021	
NATMAC	BGA (Gliding)	18/11/2021	29/11/2021	
NATMAC	BHA (Helicopter)	18/11/2021	29/11/2021	Approved 19/11/2021
NATMAC	BHPA (Hang Gliding & Paragliding)	18/11/2021	29/11/2021	
NATMAC	BMAA (Microlight Aircraft)	18/11/2021	29/11/2021	
NATMAC	BPA (British Skydiving)	18/11/2021	29/11/2021	
NATMAC	Drone Major	18/11/2021	29/11/2021	
NATMAC	European UAV Systems Centre Ltd	18/11/2021	29/11/2021	
NATMAC	GASCO (General Aviation Safety Council)	18/11/2021	29/11/2021	
NATMAC	GAA (GA Alliance) (1)	18/11/2021	29/11/2021	
NATMAC	GATCO	18/11/2021	29/11/2021	Approved 29/11/2021
NATMAC	HCGB (Helicopter Club of GB)	18/11/2021	29/11/2021	
NATMAC	Heavy Airlines	18/11/2021	29/11/2021	
NATMAC	Honourable Company of Air Pilots	18/11/2021	29/11/2021	
NATMAC	Iprosurv Drone Pilot Network	18/11/2021	29/11/2021	
NATMAC	LAA (Light Aircraft Asc)	18/11/2021	29/11/2021	
NATMAC	Low Fares Airlines	18/11/2021	29/11/2021	
NATMAC	DAATM (MoD via Defense Airspace and ATM) (1)	18/11/2021	29/11/2021	Approved 19/11/2021
NATMAC	PPL/IR (Europe)	18/11/2021	29/11/2021	
OTHER	Airlines for America	18/11/2021	29/11/2021	
OTHER	AIRE (Airlines International Rep in	18/11/2021	29/11/2021	

	Eurpoe)			
OTHER	AOC Heathrow (Airline Operations Committee)	18/11/2021	29/11/2021	
OTHER	BAR UK(Board of Airlines Reps)	18/11/2021	29/11/2021	
OTHER	Bristow Helicopters (HM Coastguard)	18/11/2021	29/11/2021	
OTHER	French Air and Space Force	18/11/2021	29/11/2021	
OTHER	IATA	18/11/2021	29/11/2021	
OTHER	Irish Air Corps	18/11/2021	29/11/2021	
OTHER	Ports of Jersey (SATCO)	18/11/2021	29/11/2021	Approved 29/11/2021
OTHER	UKSA (UK Space Agency)	18/11/2021	29/11/2021	
OTHER	Virgin Orbit Ltd	18/11/2021	29/11/2021	
OTHER	Spaceport Cornwall	18/11/2021	29/11/2021	
OTHER	Snowdonia Aerospace Centre	18/11/2021	29/11/2021	
OTHER	Black Arrow Space Technologies	18/11/2021	29/11/2021	
OTHER	Space Wales	18/11/2021	29/11/2021	
OTHER	Aerospace Cornwall	18/11/2021	29/11/2021	
AIRPORT	Glasgow	18/11/2021		Approved 23/11/2021
AIRPORT	Edinburgh	18/11/2021	29/11/2021	
AIRPORT	Prestwick	18/11/2021	29/11/2021	
AIRPORT	Manchester	18/11/2021	29/11/2021	
AIRPORT	Liverpool	18/11/2021	29/11/2021	
AIRPORT	Cardiff	18/11/2021	29/11/2021	
AIRPORT	Bristol	18/11/2021	29/11/2021	
AIRPORT	Birmingham	18/11/2021	29/11/2021	
AIRPORT	East Midlands	18/11/2021	29/11/2021	
AIRPORT	Coventry	18/11/2021	29/11/2021	
AIRPORT	Dublin	18/11/2021	29/11/2021	
AIRPORT	Aldergrove	18/11/2021	29/11/2021	
AIRPORT	Belfast City	18/11/2021	29/11/2021	
AIRPORT	Heathrow	18/11/2021	29/11/2021	
AIRPORT	Gatwick	18/11/2021	29/11/2021	Approved 29/11/2021
AIRPORT	Stansted	18/11/2021	29/11/2021	
AIRPORT	Luton	18/11/2021	29/11/2021	Approved 29/11/2021
AIRPORT	Cambridge	18/11/2021	29/11/2021	Approved 30/11/2021
AIRPORT	London City	18/11/2021	29/11/2021	
AIRPORT	Biggin Hill	18/11/2021	29/11/2021	
AIRPORT	Southend	18/11/2021	29/11/2021	
AIRPORT	Warton	18/11/2021	29/11/2021	
AIRPORT	Teeside International	18/11/2021	29/11/2021	
AIRPORT	Leeds Bradford	18/11/2021	29/11/2021	
AIRPORT	Doncaster	18/11/2021	29/11/2021	
AIRPORT	Humberside	18/11/2021	29/11/2021	
AIRPORT	Norwich	18/11/2021	29/11/2021	Approved 29/11/2021
AIRPORT	Jersey	18/11/2021	29/11/2021	
AIRPORT	Guernsey	18/11/2021	29/11/2021	
AIRPORT	Southampton	18/11/2021		Approved 23/11/2021
AIRPORT	Bournemouth	18/11/2021	29/11/2021	
AIRPORT	Farnborough	18/11/2021	29/11/2021	
AIRPORT	Oxford	18/11/2021	29/11/2021	

AIRPORT	Aberdeen			Approved 23/11/2021

7. Conclusion

Throughout the design principles engagement, we supplied stakeholders with a set of draft design principles, to provoke discussion and welcomed their feedback.

We received approval of the draft design principles from all stakeholders who responded.

This has resulted in the list of design principles as detailed in the Executive Summary, they are now being progressed under the Airspace Change Process CAP1616 Stage 1.

Annex A: Initial Engagement email sent to all stakeholders on 18/11/2021

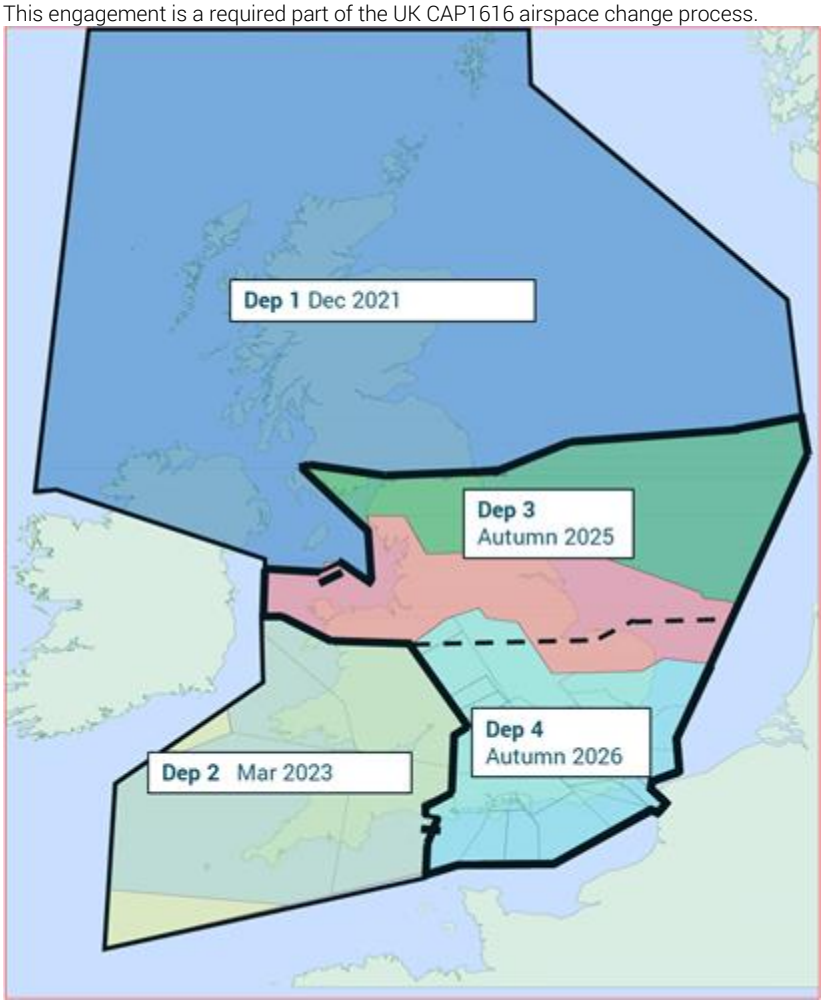
From: Airspace Consultation <airspaceconsultation@nats.co.uk>
Sent: Thursday, November 18, 2021 4:56:36 PM
Subject: UK Free Route Airspace (FRA), Deployment 3 and 4 (D3 & D4) Design Principles

Dear Colleague,
NATS are currently in the process of proposing airspace changes to implement Free Route Airspace (FRA) within high altitude airspace across the UK.

This process is split into four deployments within the UK airspace, as shown in the below diagram. Each deployment has to follow similar (parallel) workstreams to comply with airspace change regulations (CAP1616).

The first deployment (D1) of FRA will be implemented on 3 Dec 2021.
The second deployment (D2) is currently in Consultation stage with expected deployment in March 2023.
For the third and fourth deployments (D3 & D4) (outlined in thick black line, in the diagram) we are required to engage with you on the Design Principles to be used by this project.

This engagement is a required part of the UK CAP1616 airspace change process.



Below are a draft set of design principles for the FRA D3 & D4 changes. You may already be familiar with these as these are based on the design principles which were developed via engagement with all stakeholders for FRA D1 and D2.
We have built on the Design Principles for Deployments 1 & 2 to ensure consistency across the deployments.

The relative priorities (A – highest, C - lowest) are indicated next to each.
Please can you review these and give us your comments.
If you have any suggestions for changes or additional design principles we welcome your input.

If you are content with the proposed design principles you can respond using the "Approve" voting button (or simply reply saying "Approve").

If you have comments please reply to this email. We would be grateful if you could respond this by 1 December 2021

Kind regards

NATS Airspace Change Team

DRAFT DESIGN PRINCIPLES FOR FRA D3 & D4

DP0 Safety (A)
Maintain or enhance current levels of safety.

DP1 Operational (Resilience) (B)
The proposed airspace will maintain or enhance operational resilience of the ATC network.

DP2 Economic (Network Performance) (B)
The proposed FRA airspace will facilitate optimised network economic performance.

DP3 Environmental (CO2 Emissions) (B)
The proposed FRA airspace will facilitate the reduction of CO_2 emissions per flight in line with UK Government strategy to become Net Zero by 2050

DP4 Environmental (Impact to Stakeholders on the Ground) (C)
Minimise environmental impacts to stakeholders on the ground
(note: due to the altitude of the proposed changes (>20,000ft), it is not expected that there will be any significant environmental impacts to stakeholders on the ground due to noise, visual intrusion or local air quality)

DP5 Operational (Optimised Trajectories) (B)
Create an environment within which AOs may freely flight plan optimised trajectories between defined entry and exit points.

DP6 Technical (Interface) (A)
The interface between FRA and the ATS route network will be optimised for safety.

DP7 Technical (Flight Efficiency) (B)
The interface between FRA and the ATS route network will maintain or improve flight efficiency compared to current day operations.

DP8 Technical (MoD Requirements) (B)
The FRA airspace will be compatible with the requirements of the MoD and take into consideration the requirements of defence industry stakeholders.

DP9 Technical (GA Impacts) (B)
The impacts on GA and other civilian airspace users due to FRA will be minimised.

DP10 Policy (PCP) (A)
The proposed FRA airspace will fulfil the requirements of the AMS (CAP1711).

DP11 Implementation (Phasing) (B)
The proposed FRA airspace will be suitable for introduction in a phased implementation.

DP12 Operational (Adjacent ANSPs) (B)
Connectivity to adjacent airspace (FRA or non-FRA) will be maintained or enhanced.

DP13 Operational (Capacity) (B)
FRA will maintain current ATC capacity, and will aim to maximise airspace capacity.

DP14 Operational (Flexible Use Airspace) (B)
The proposed FRA airspace will be compatible with the Flexible Use Airspace (FUA) concept.

Annex B: Reminder Engagement email sent to all stakeholders on 29/11/2021

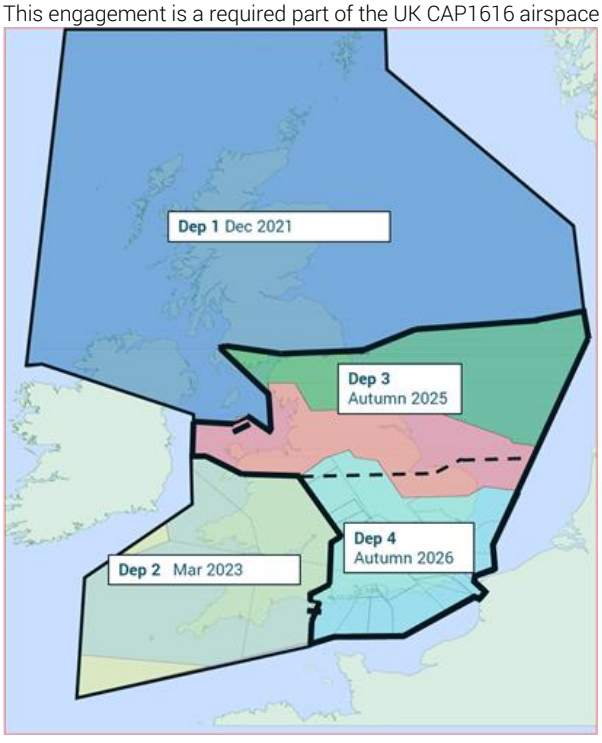
From: Airspace Consultation <airspaceconsultation@nats.co.uk>
Sent: 29 November 2021 10:35
Subject: REMINDER: UK Free Route Airspace (FRA), Deployment 3 and 4 (D3 & D4) Design Principles

Dear Colleague,
We recently wrote to you to ask your views on the draft design principles for the 3rd and 4th deployment of Free Route Airspace across UK airspace.
We would love to hear your views by 1 December 2021.
If you are content with the proposed design principles you can simply reply saying "Approve".
If you have comments please send by reply to this email.
Kind regards
NATS Airspace Change Team

NATS are currently in the process of proposing airspace changes to implement Free Route Airspace (FRA) within high altitude airspace across the UK.
This process is split into four deployments within the UK airspace, as shown in the below diagram. Each deployment has to follow similar (parallel) workstreams to comply with airspace change regulations (CAP1616).

The first deployment (D1) of FRA will be implemented on 3 Dec 2021.
The second deployment (D2) is currently in Consultation stage with expected deployment in March 2023.
For the third and fourth deployments (D3 & D4) (outlined in thick black line, in the diagram) we are required to engage with you on the Design Principles to be used by this project.

This engagement is a required part of the UK CAP1616 airspace change process.



Below are a draft set of design principles for the FRA D3 & D4 changes. You may already be familiar with these as these are based on the design principles which were developed via engagement with all stakeholders for FRA D1 and D2.
We have built on the Design Principles for Deployments 1 & 2 to ensure consistency across the deployments.

The relative priorities (A – highest, C - lowest) are indicated next to each.
Please can you review these and give us your comments.
If you have any suggestions for changes or additional design principles we welcome your input.

DRAFT DESIGN PRINCIPLES FOR FRA D3 & D4

DP0 Safety (A)
Maintain or enhance current levels of safety.

DP1 Operational (Resilience) (B)
The proposed airspace will maintain or enhance operational resilience of the ATC network.

DP2 Economic (Network Performance) (B)
The proposed FRA airspace will facilitate optimised network economic performance.

DP3 Environmental (CO2 Emissions) (B)
The proposed FRA airspace will facilitate the reduction of CO_2 emissions per flight in line with UK Government strategy to become Net Zero by 2050

DP4 Environmental (Impact to Stakeholders on the Ground) (C)
Minimise environmental impacts to stakeholders on the ground
(note: due to the altitude of the proposed changes (>20,000ft), it is not expected that there will be any significant environmental impacts to stakeholders on the ground due to noise, visual intrusion or local air quality)

DP5 Operational (Optimised Trajectories) (B)
Create an environment within which AOs may freely flight plan optimised trajectories between defined entry and exit points.

DP6 Technical (Interface) (A)
The interface between FRA and the ATS route network will be optimised for safety.

DP7 Technical (Flight Efficiency) (B)
The interface between FRA and the ATS route network will maintain or improve flight efficiency compared to current day operations.

DP8 Technical (MoD Requirements) (B)
The FRA airspace will be compatible with the requirements of the MoD and take into consideration the requirements of defence industry stakeholders.

DP9 Technical (GA Impacts) (B)
The impacts on GA and other civilian airspace users due to FRA will be minimised.

DP10 Policy (PCP) (A)
The proposed FRA airspace will fulfil the requirements of the AMS (CAP1711).

DP11 Implementation (Phasing) (B)
The proposed FRA airspace will be suitable for introduction in a phased implementation.

DP12 Operational (Adjacent ANSPs) (B)
Connectivity to adjacent airspace (FRA or non-FRA) will be maintained or enhanced.

DP13 Operational (Capacity) (B)
FRA will maintain current ATC capacity, and will aim to maximise airspace capacity.

DP14 Operational (Flexible Use Airspace) (B)
The proposed FRA airspace will be compatible with the Flexible Use Airspace (FUA) concept.

ANNEX C: Engagement evidence with IAA

From: [redacted]
Sent: 02 December 2021 16:38
To: Airspace Consultation <airspaceconsultation@nats.co.uk>
Cc: [redacted]
Subject: 211130 UK Free Route Airspace (FRA), Deployment 3 and 4 (D3 & D4) Design Principles - IAA ANSP Response-NATS Acknowledgement
Importance: High

Many thanks for the prompt reply [redacted]

Your acknowledgement text is appreciated and I'm copying interested parties from the IAA ANSP who are contributors to the ANSP response.

Kind regards,

[redacted]
Údarás Eitlíochta na hÉireann / Irish Aviation Authority
[redacted]
✉ [redacted]
[redacted]
[redacted]
www.iaa.ie
Do you *really* need to print this?

From: Airspace Consultation <airspaceconsultation@nats.co.uk>
Sent: Thursday 2 December 2021 15:02
To: [redacted]
Subject: 211130 UK Free Route Airspace (FRA), Deployment 3 and 4 (D3 & D4) Design Principles - IAA ANSP Response

*** This message originated from outside the Irish Aviation Authority. Please treat hyperlinks, attachments and instructions in this email with caution. ***

Dear [redacted]
Thanks for taking the time to respond to our email with the FRA D3 & D4 draft Design Principles.
Please find below a response to each of your comments.
We have accepted your responses as agreement of all the design principles and look forward to continued work with yourselves as we move to the design stages to ensure we can capture and include all the comments you have made in our design work.
Kind regards
[redacted]

From: [redacted]
Sent: 30 November 2021 18:53
To: Airspace Consultation <airspaceconsultation@nats.co.uk>
Cc: [redacted]
Subject: 211130 UK Free Route Airspace (FRA), Deployment 3 and 4 (D3 & D4) Design Principles - IAA ANSP Response
Importance: High

Dear NATS Airspace Change Team,

In response to the request to comment on the draft design principles for the 3rd and 4th deployment of Free Route Airspace across UK airspace, I'm responding on behalf of the IAA ANSP as follows:

1. *With passing reference to the 1st and 2nd deployment of Free Route Airspace (as depicted in the airspace diagram):*
   - The first deployment (D1) of FRA will be implemented in December 2021 - Engagement between the parties has been completed and deployment is on track for ***02DEC2021***
   - The second deployment (D2) is currently in Consultation stage with expected deployment in March 2023 - The IAA ANSP has been engaged with the NATS Airspace Change Team and has supplied comments through the CAA Airspace Change portal

   Acknowledged, thank you

2. *3rd and 4th deployment Design Principles Responses for IAA ANSP:*

DRAFT DESIGN PRINCIPLES FOR FRA D3 & D4 (A – highest ; C - lowest)

- **DP0 Safety** **(A)**

Maintain or enhance current levels of safety.
IAA ANSP Response: Agreed
Acknowledged, thank you

- **DP1 Operational (Resilience) (B)**

The proposed airspace will maintain or enhance operational resilience of the ATC network.
IAA ANSP Response: Agreed in principle Acknowledged, thank you

- Comment Deployment 3: of immediate interest due to the "Dublin Sectors" interface at a constrained FIR Interface
- Comment Deployment 4: Upstream impact for Shannon En route Sectors of interest for traffic delivery as this project progresses

Acknowledged, NATS will of course be engaging with yourselves at Stage 2 & 3 as we seek to develop design options for both deployments, which will need to consider this DP.

- **DP2 Economic (Network Performance) (B)**

The proposed FRA airspace will facilitate optimised network economic performance.
IAA ANSP Response: Agreed in principle

- Comment: As part of Cross-border FRA, these projects have potential to deliver significant network economic performance. However, this is dependent on full FRA deployment rather than FRA with systemised (FRA) routing as seen in UK FRA Dep 2 and possible associated RADs, which may potentially impact upstream and downstream ACCs/FIRs

Acknowledged, NATS will of course be engaging with yourselves at Stage 2 & 3 as we seek to develop design options for both deployments, which will need to consider this DP.

- **DP3 Environmental (CO2 Emissions) (B)**

The proposed FRA airspace will facilitate the reduction of CO_2 emissions per flight in line with UK Government strategy to become Net Zero by 2050
IAA ANSP Response: Agreed in principle

- Comment: Adjacent ACCs/FIRs have equally onerous environmental deliverables and the IAA ANSP will request "network" data on environmental performance, as these deployments progress

Acknowledged.

- **DP4 Environmental (Impact to Stakeholders on the Ground) (C)**

Minimise environmental impacts to stakeholders on the ground
(note: due to the altitude of the proposed changes (>20,000ft), it is not expected that there will be any significant environmental impacts to stakeholders on the ground due to noise, visual intrusion or local air quality)
IAA ANSP Response: Agreed in principle

- Comment/ Question: Does this equally apply to adjacent FIR airports, specifically EIDW which is proximate to FRA Dep 3 airspace?

Acknowledged, NATS will be engaging with yourselves further to develop and agree designs, but the Design Principles are relevant to the FIR boundary.

- **DP5 Operational (Optimised Trajectories) (B)**

Create an environment within which AOs may freely flight plan optimised trajectories between defined entry and exit points.
IAA ANSP Response: Agreed in principle

- Comment: The IAA ANSP will request a broader definition of Entry/Exit in the context of Cross-border FRA which is a core principle of trajectory optimisation

Acknowledged.

- **DP6 Technical (Interface) (A)**

The interface between FRA and the ATS route network will be optimised for safety.
IAA ANSP Response: Agreed with no comments

- **DP7 Technical (Flight Efficiency) (B)**

The interface between FRA and the ATS route network will maintain or improve flight efficiency compared to current day operations.
IAA ANSP Response: Agreed with no comments

- **DP8 Technical (MoD Requirements) (B)**

The FRA airspace will be compatible with the requirements of the MoD and take into consideration the requirements of defence industry stakeholders.
IAA ANSP Response: Agreed in principle

- Comment: (MoD) Interfaces with Shannon FIR/UIR of concern in a FUA context and underpinned by cross-border FRA

Acknowledged, NATS will of course be engaging with yourselves at Stage 2 as we seek to develop design options for both deployments.

- **DP9 Technical (GA Impacts) (B)**

The impacts on GA and other civilian airspace users due to FRA will be minimised.
IAA ANSP Response: Agreed with no comments

- **DP10 Policy (PCP) (A)**

The proposed FRA airspace will fulfil the requirements of the AMS (CAP1711).
IAA ANSP Response: Agreed with no comments

- **DP11 Implementation (Phasing)** **(B)**

The proposed FRA airspace will be suitable for introduction in a phased implementation.

IAA ANSP Response: Agreed in principle

  - Comment: We note that a phased implementation is necessary as outlined. However, the full rollout of FRA for each deployment, with no more than initial traffic management measures/ STAMs, would be a concern for the IAA ANSP should longer-term measures be considered or needed as part of each deployment

Acknowledged, NATS will of course be engaging with yourselves further as we seek to develop and implement both deployments.

- **DP12 Operational (Adjacent ANSPs)** **(B)**

Connectivity to adjacent airspace (FRA or non-FRA) will be maintained or enhanced.

IAA ANSP Response: Agreed

  - *Comment: This is of key interest for the IAA ANSP and indeed an expected output would be longer-range FRA DCT for upper airspaces. As part of design principles, the IAA ANSP preference would involve a fuller examination of the inter-ANSP interfaces, with a clearer definition of Entry/Exit/Intermediate FRA waypoints key and most especially in the context of cross-border FRA*

Acknowledged, NATS will be engaging with yourselves at Stage 2 & 3 where this detail can be considered at part of the design option development.

- **DP13 Operational (Capacity)** **(B)**

FRA will maintain current ATC capacity, and will aim to maximise airspace capacity.

IAA ANSP Response: Agreed with no comments

- **DP14 Operational (Flexible Use Airspace)** **(B)**

The proposed FRA airspace will be compatible with the Flexible Use Airspace (FUA) concept.

IAA ANSP Response: Agreed in principle

  - Comment: It should be noted that currently FUA applies across the UK-IRL FAB and may have broader implications than this design principle reflects

Acknowledged.

Kind regards,

[redacted]
[redacted]
Údarás Eitlíochta na hÉireann / Irish Aviation Authority
[redacted]
✉ [redacted]
[redacted]
[redacted]
www.iaa.ie