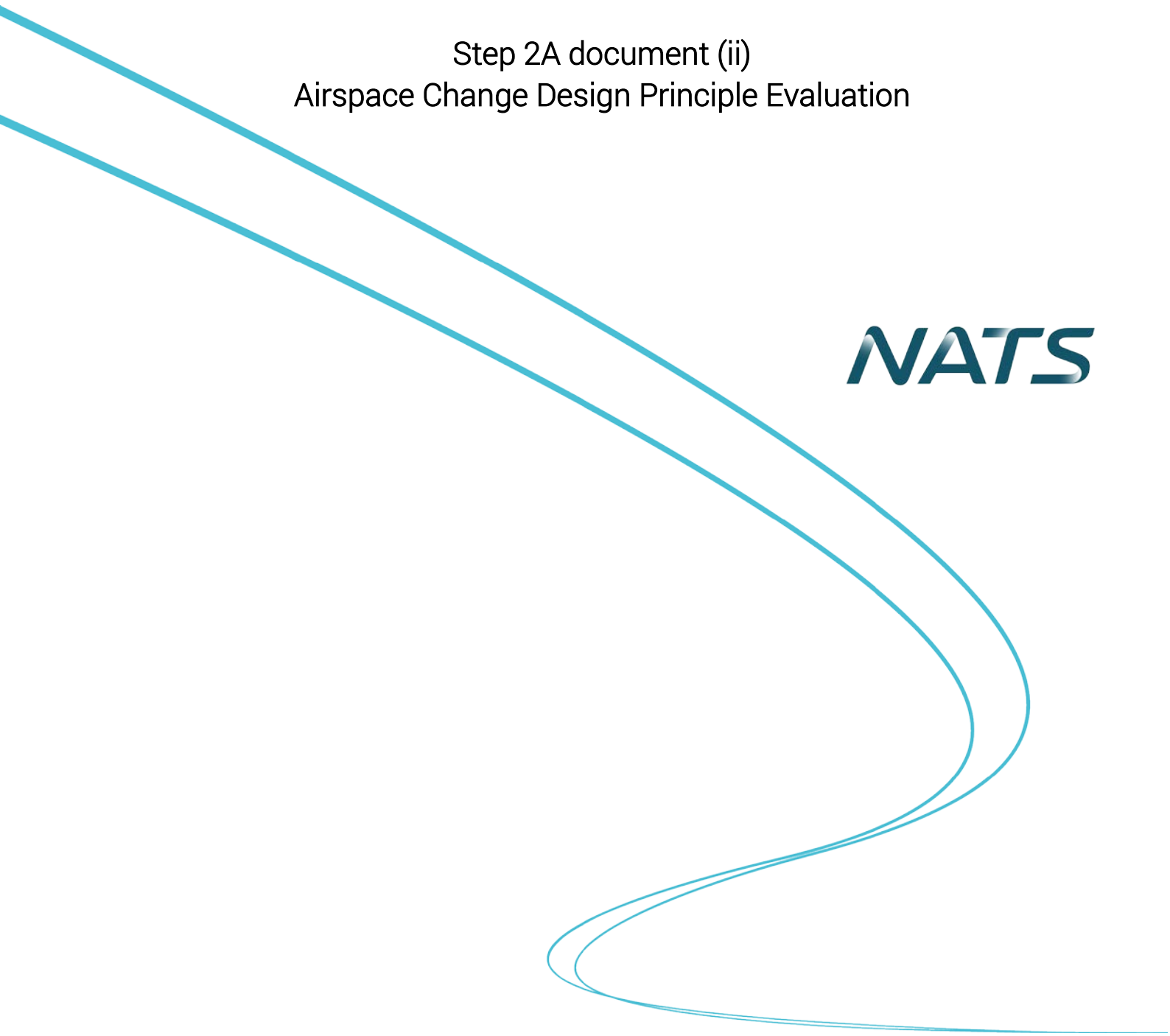
Operational Service Enhancement Project:-
New Amsterdam/London UIR Crossing Point

Gateway documentation:
Stage 2 Develop and Assess

Step 2A document (ii)
Airspace Change Design Principle Evaluation



NATS Public

© 2021 NATS (En-route) plc, ('NERL') all rights reserved

Roles

Action	Role	Date
Produced	Airspace Change Specialist NATS Airspace Change Compliance & Delivery	November 2021
Reviewed Approved	ATC Lead NATS	November 2021
Reviewed Approved	Airspace Implementation Manager NATS	November 2021
Reviewed Approved	OSEP Project Manager NATS	November 2021

Drafting and Publication History

Issue	Month/Year	Changes this issue
1.0	November/ 2021	Published to the CAA online portal

Contents

1. Introduction

This document forms part of the document set in accordance with the requirements of the CAP1616 airspace change process.

This document aims to provide adequate evidence to satisfy Stage 2 Develop and Assess Gateway, Step 2A Design Principle Evaluation.

It is advised that this document is read alongside the Stage 2A(i) Design Options Document which gives descriptions of each option.

This ACP will introduce new connectivity to a new COP in the Southern North Sea, on the London/ Amsterdam FIR interface which MUAC will introduce. Owing to the extant SUA Structures within this region of the North Sea, this proposal is limited to a single design concept:

- Connectivity to UK ATS Network provided through the introduction/amendment of new/extant CDRs.

Using this design concept, the following six options to provide connectivity between the UK ATS route network and the new COP are proposed for consideration:

- Option 1: Connectivity for overflight traffic.
- Option 2: Connectivity for overflight traffic and ScTMA airfields.
- Option 3: Connectivity for Manchester/Midland and Dublin group airfields.
- Option 4: Connectivity for London group airfields and overflight traffic.
- Option 4a: Alternative connectivity for London group airfields and overflight traffic.
- Option 5: Replication of Existing Night-Time Fuel Saving Routes for daytime use.

Whilst these options can be implemented independently, they are compatible with each other and can be implemented coincidentally. The maximum benefit and Design Principle alignment will only be realised if all options are implemented.

2. Options Assessment: Design Principle Evaluation

Tables 1-6 below summarise the impacts/ benefits of the options evaluated. The tables are based on the pro-forma contained in CAP1616 Appendix E, page 208. The degree to which the design principle has been met is indicated by the following assessment criteria:

© 2021 NATS (En-route) plc

Design Principle		Priority	Description	Assessment Criteria		
No	Category			Does not meet	Partially meets	Met
1	Safety	1	Maintain or enhance current levels of safety.	Unlikely to pass a safety case due to major safety issues from proposed changes	Issues identified that would require a robust safety case e.g. workload, IFP (flyability), new hazards	No significant safety issues identified
2	Policy	1	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	Does not accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	N/a	Accords with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.
3	Resilience	2	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Reduction in the operational resilience of the UK ATC network	N/a	Maintain or enhance the operational resilience of the UK ATC network
4	Operational (Airspace Optimisation)	2	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	No Connectivity to the new reporting point	Minimal connectivity to enable connectivity to a new COP on the UIR boundary	Multiple connections to new reporting point introduced

5	Operational (Airspace Optimisation)	2	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	Existing upper route connectivity between London / Amsterdam UIRs is not reviewed and optimised for Amsterdam FRA operations.	Existing upper route connectivity between London / Amsterdam UIRs is reviewed and limited improvements for Amsterdam FRA operations.	Existing upper route connectivity between London / Amsterdam UIRs is reviewed and optimised for Amsterdam FRA operations.
6	Operational (MUAC Connectivity)	2	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	Proposed change does not meet with MUAC requirements	Partially fulfils MUAC requirements	Proposed change does meet with MUAC requirements
7	Environmental (CO_2 Emissions)	2	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	Net increase in CO_2 emissions per flight.	No change	Net reduction in CO_2 emissions per flight
8	Environmental (Impact to Stakeholders on the Ground)	2	Minimise environmental impacts to stakeholders on the ground.	Major impact to stakeholders on the ground	Minor impact to stakeholders on the ground	No impact or positive impact to stakeholders on the ground
9	Technical (MoD Requirements)	2	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Major impact or safety critical impact	Manageable impact and not safety critical	No impact or positive impact
10	Technical (Minimise CAS)	2	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	Changes are not contained within extant CAS above FL195 and require additional CAS	N/a	Changes are contained within extant CAS above FL195 and require no additional CAS

11	Technical (Modernisation	2	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	Does not produce any additional connectivity beneficial for FRA	Introduces limited connectivity beneficial for FRA	Introduces optimised connectivity beneficial for FRA
12	Operational (Training)	2	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Major impact	Minor impact	No impact

Assessment Criteria for Progression

Each Design Principle has been given a priority, as described in Stage 1. There are three priorities, 1-3, with 1 being the highest. Two DPs, DP1 Safety and DP2 AMS Accordance, are Priority 1. Any design option evaluation that results in either DP1 or 2 being Not Met (red) or Partially Met (amber) would result in the rejection of that option.

Design options may progress to the later stages of the ACP process without fully meeting (rated green) all the design principles.

2.0 Baseline (Do Nothing Option)

Design Principle Evaluation			
Do Nothing Option			REJECT
No change in the current connectivity from today's operation.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	Without connectivity introduced to a new COP on the London/ Amsterdam interface, aircraft cannot realise the full FRA benefits within the Amsterdam UIR. Aircraft are required to flight plan less expeditious routes, resulting in inefficient use of the airspace, increased fuel burn and CO_2 emissions. This is contrary to the CAP1711 known outcomes of airspace modernisation.	NOT MET
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	No Change from today's operation so operational resilience will be maintained	MET
DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	No connectivity to the new reporting point is introduced	NOT MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	Existing UIR Connectivity is not reviewed or optimised for FRA operations within the Amsterdam UIR	NOT MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	No change to existing connectivity, therefore connectivity does not meet with the MUAC FRA requirements.	NOT MET
DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	No Change from today's operation therefore CO_2 emissions will not change.	PARTIALLY MET
DP8	Minimise environmental impacts to stakeholders on the ground.	No Change from today's operation therefore impact to stakeholders on the ground will not change.	MET
DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	No Change from today's operation therefore no impact on MoD operations.	MET

DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	No Change from today's operation therefore no change in CAS required.	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	No additional connectivity beneficial to FRA introduced at the London/ Amsterdam interface.	NOT MET
DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	No Change to today's operation.	MET

Table 1: Design Principle evaluation of the "Do Nothing" option.

"Do Nothing" Option Conclusion

The Do Nothing option does not provide connectivity to the new COP introduced by MUAC (DP4), review existing connectivity between the London and Amsterdam UIRs (DP5), offers any additional benefit to current European FRA (DP6) or provides any basis for future UK FRA operations (DP10). Furthermore, this option is contrary to the AMS and therefore does not meet the high priority DP2. For these reasons the "Do Nothing" Option is rejected.

2.1 Option 1: Connectivity for overflight traffic.

Design Principle Evaluation			
Option 1: Connectivity for overflight traffic			Progressed
Connectivity introduced for overflight traffic.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	By providing connectivity to a new COP on the London/ Amsterdam interface, aircraft can realise the full FRA benefits within the Amsterdam UIR. Aircraft will be able to flight plan and fly more direct routes, resulting in improved efficiency within the airspace, reducing fuel burn and CO_2 emissions. This is inline with the CAP1711 known outcomes of airspace modernisation.	MET
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Operational resilience will be enhanced by ATC being able to pre-empt FRA trajectory planning for overflights.	MET
DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	This option introduces connectivity for overflight traffic. Aircraft destined for or leaving a UK airfield are not accommodated within this option.	PARTIALLY MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	This option reviews the connectivity for overflight traffic only. Aircraft destined for or leaving a UK airfield are not considered and will not realise the full benefits of FRA within the Amsterdam UIR.	PARTIALLY MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	This option provides limited improvements to the London/ Amsterdam UIR Interface and on its own but does not fully meet with MUACs requirements.	PARTIALLY MET
DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	By introducing connectivity to a new COP there will be a net reduction in CO_2 emissions per flight.	MET

DP8	Minimise environmental impacts to stakeholders on the ground.	As the change is above FL195, there will be no perceptible impact to stakeholders on the ground	MET
DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Introduction of CDRs is fully compatible with FUA principles and will not impact MoD operations	MET
DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	Changes to overflights will be contained above FL195. Therefore, no additional CAS will be required	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	This option provides additional connectivity for overflights at the London/ Amsterdam UIR Interface providing limited benefit for future FRA airspace	PARTIALLY MET
DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Connectivity to a new COP could have a minor operational impact to airspace users requiring some additional training.	PARTIALLY MET

Table 2: Design Principle evaluation of "Option 1".

"Option 1" Conclusion

The introduction of connectivity for overflight traffic meets or partially meets all design principles. Whilst this option does provide connectivity to the new COP (DP4), this connectivity is minimal, aircraft arriving at/ departing the UK are not considered. This limited connectivity also accounts for the partially met assessment of DPs 5, 6 and 11. However, the benefit assessed by these three DPs will increase with each additional Design Option implemented, becoming met if all 6 options are approved. Airspace users might require some additional training associated with the introduction of new connectivity (DP12) however this training will have minimal operational impact. For these reasons, "Option 1" will be is progressed.

2.2 Option 2: Connectivity for overflight traffic and ScTMA airfields.

Design Principle Evaluation			
Option 2: Connectivity for overflight traffic and ScTMA airfields			Progressed
Connectivity introduced for overflights and aircraft arriving/ departing the ScTMA airfields.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	By providing connectivity to a new COP on the London/ Amsterdam interface, aircraft can realise the full FRA benefits within the Amsterdam UIR. Aircraft will be able to flight plan and fly more direct routes, resulting in improved efficiency within the airspace, reducing fuel burn and CO_2 emissions. This is inline with the CAP1711 known outcomes of airspace modernisation.	MET
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Operational resilience will be enhanced by ATC being able to pre-empt FRA trajectory planning for overflights and ScTMA traffic.	MET

DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	This option introduces connectivity for overflights and ScTMA traffic. Aircraft arriving/ departing other UK airfields are not accommodated within this option.	PARTIALLY MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	This option reviews the connectivity for overflights and ScTMA trafficc only. Aircraft arriving/ departing other UK airfields are not considered and will not realise the full benefits of FRA within the Amsterdam UIR.	PARTIALLY MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	This option provides limited improvements to the London/ Amsterdam UIR Interface and on its own but does not fully meet with MUACs requirements.	PARTIALLY MET
DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	By introducing connectivity to a new COP there will be a net reduction in CO_2 emissions per flight.	MET
DP8	Minimise environmental impacts to stakeholders on the ground.	As the change is above FL195, there will be no perceptible impact to stakeholders on the ground	MET

DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Introduction of CDRs is fully compatible with FUA principles and will not impact MoD operations	MET
DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	Changes to overflights and ScTMA traffic will be contained above FL195. Therefore, no additional CAS will be required	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	This option provides additional connectivity for overflights and ScTMA Traffic at the London/ Amsterdam UIR Interface providing limited benefit for future FRA airspace	PARTIALLY MET
DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Connectivity to a new COP could have a minor operational impact to airspace users requiring some additional training.	PARTIALLY MET

Table 3: Design Principle evaluation of "Option 2".

"Option 2" Conclusion

The introduction of connectivity for overflight and ScTMA traffic meets or partially meets all design principles. Whilst this option does provide connectivity to the new COP (DP4), this connectivity is minimal, aircraft arriving at/ departing UK airfields outside the ScTMA are not considered. This limited connectivity also accounts for the partially met assessment of DPs 5, 6 and 11. However, the benefit assessed by these three DPs will increase with each additional Design Option implemented, becoming met if all 6 options are approved. Airspace users might require some additional training associated with the introduction of new connectivity (DP12) however this training will have minimal operational impact. For these reasons, "Option 2" will be is progressed.

2.3 Option 3: Connectivity for Manchester/Midland and Dublin group airfields.

Design Principle Evaluation			
Option 3: Connectivity for Manchester/Midland and Dublin group airfields			Progress
Connectivity introduced for aircraft arriving/ departing from the Manchester/Midland and Dublin group airfields			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	By providing connectivity to a new COP on the London/ Amsterdam interface, aircraft can realise the full FRA benefits within the Amsterdam UIR. Aircraft will be able to flight plan and fly more direct routes, resulting in improved efficiency within the airspace, reducing fuel burn and CO_2 emissions. This is inline with the CAP1711 known outcomes of airspace modernisation.	MET
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Operational resilience will be enhanced by ATC being able to pre-empt FRA trajectory planning for aircraft arriving/departing the Manchester/ Midland and Dublin group airfields.	MET

DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	This option introduces connectivity for aircraft arriving/departing the Manchester/ Midland and Dublin group airfields. Aircraft overflying the UK or arriving/ departing other UK airfields are not accommodated within this option.	PARTIALLY MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	This option reviews the connectivity for aircraft arriving/departing the Manchester/ Midland and Dublin group airfields. Aircraft overflying the UK or arriving/ departing other UK airfields are not considered and will not realise the full benefits of FRA within the Amsterdam UIR.	PARTIALLY MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	This option provides limited improvements to the London/ Amsterdam UIR Interface and on its own but does not fully meet with MUACs requirements.	PARTIALLY MET

DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	By introducing connectivity to a new COP there will be a net reduction in CO_2 emissions per flight.	MET
DP8	Minimise environmental impacts to stakeholders on the ground.	As the change is above FL195, there will be no perceptible impact to stakeholders on the ground	MET
DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Introduction of CDRs is fully compatible with FUA principles and will not impact MoD operations	MET
DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	Changes to aircraft arriving/departing the Manchester/ Midland and Dublin group airfields will be contained above FL195. Therefore, no additional CAS will be required	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	This option provides additional connectivity for aircraft arriving/departing the Manchester/ Midland and Dublin group airfields at the London/ Amsterdam UIR Interface providing limited benefit for future FRA airspace	PARTIALLY MET

DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Connectivity to a new COP could have a minor operational impact to airspace users requiring some additional training.	PARTIALLY MET

Table 3: Design Principle evaluation of "Option 3".

"Option 3" Conclusion

The introduction of connectivity for Manchester, Midland and Dublin group traffic meets or partially meets all design principles. Whilst this option does provide connectivity to the new COP (DP4), this connectivity is minimal, aircraft overflying or arriving at/ departing UK airfields outside of these groups are not considered. This limited connectivity also accounts for the partially met assessment of DPs 5, 6 and 11. However, the benefit assessed by these three DPs will increase with each additional Design Option implemented, becoming met if all 6 options are approved. Airspace users might require some additional training associated with the introduction of new connectivity (DP12) however this training will have minimal operational impact. For these reasons, "Option 3" will be is progressed.

2.4 Option 4: Connectivity for London group airfields and overflight traffic.

Design Principle Evaluation			
Option 4: Connectivity for London group airfields and overflight traffic			Progress
Connectivity introduced for London group airfields and overflight traffic			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	By providing connectivity to a new COP on the London/ Amsterdam interface, aircraft can realise the full FRA benefits within the Amsterdam UIR. Aircraft will be able to flight plan and fly more direct routes, resulting in improved efficiency within the airspace, reducing fuel burn and CO_2 emissions. This is inline with the CAP1711 known outcomes of airspace modernisation.	MET
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Operational resilience will be enhanced by ATC being able to pre-empt FRA trajectory planning for aircraft arriving/departing the London group airfields and overflight traffic.	MET

DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	This option introduces connectivity for aircraft arriving/departing London group airfields and aircraft overflying the UK. Aircraft arriving/ departing other UK airfields are not accommodated within this option.	PARTIALLY MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	This option reviews the connectivity for aircraft arriving/departing the London group airfields and aircraft overflying the UK. Aircraft arriving/ departing other UK airfields are not considered and will not realise the full benefits of FRA within the Amsterdam UIR.	PARTIALLY MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	This option provides limited improvements to the London/ Amsterdam UIR Interface and on its own but does not fully meet with MUACs requirements.	PARTIALLY MET
DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	By introducing connectivity to a new COP there will be a net reduction in CO_2 emissions per flight.	MET

DP8	Minimise environmental impacts to stakeholders on the ground.	As the change is above FL195, there will be no perceptible impact to stakeholders on the ground	MET
DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Introduction of CDRs is fully compatible with FUA principles and will not impact MoD operations	MET
DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	Changes to aircraft arriving/departing the London group airfields and aircraft overflying the UK will be contained above FL195. Therefore, no additional CAS will be required	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	This option provides additional connectivity for aircraft arriving/departing the London group airfields and aircraft overflying the UK at the London/ Amsterdam UIR Interface providing limited benefit for future FRA airspace	PARTIALLY MET
DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Connectivity to a new COP could have a minor operational impact to airspace users requiring some additional training.	PARTIALLY MET

Table 4: Design Principle evaluation of "Option 4".

"Option 4" Conclusion

The introduction of connectivity for Overflights and London group traffic meets or partially meets all design principles. Whilst this option does provide connectivity to the new COP (DP4), this connectivity is minimal, aircraft arriving at/ departing UK airfields outside of this group are not considered. This limited connectivity also accounts for the partially met assessment of DPs 5, 6 and 11. However, the benefit assessed by these three DPs will increase with each additional Design Option implemented, becoming met if all 6 options are approved. Airspace users might require some additional training associated with the introduction of new connectivity (DP12) however this training will have minimal operational impact. For these reasons, "Option 4" will be is progressed.

2.5 Option 4a: Alternative connectivity for London group airfields and overflight traffic.

Design Principle Evaluation			
Option 4a: Alternative connectivity for London group airfields and overflight traffic			Progress
Alternative connectivity introduced for London group airfields and overflight traffic when more Danger areas are active.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	By providing connectivity to a new COP on the London/ Amsterdam interface, aircraft can realise the full FRA benefits within the Amsterdam UIR. Aircraft will be able to flight plan and fly more direct routes, resulting in improved efficiency within the airspace, reducing fuel burn and CO_2 emissions. This is inline with the CAP1711 known outcomes of airspace modernisation.	MET
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Operational resilience will be enhanced by ATC being able to pre-empt FRA trajectory planning for aircraft arriving/departing the London group airfields and overflight traffic.	MET

DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	This option introduces connectivity for aircraft arriving/departing London group airfields and aircraft overflying the UK. Aircraft arriving/ departing other UK airfields are not accommodated within this option.	PARTIALLY MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	This option reviews the connectivity for aircraft arriving/departing the London group airfields and aircraft overflying the UK. Aircraft arriving/ departing other UK airfields are not considered and will not realise the full benefits of FRA within the Amsterdam UIR.	PARTIALLY MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	This option provides limited improvements to the London/ Amsterdam UIR Interface and on its own but does not fully meet with MUACs requirements.	PARTIALLY MET
DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	By introducing connectivity to a new COP there will be a net reduction in CO_2 emissions per flight.	MET

DP8	Minimise environmental impacts to stakeholders on the ground.	As the change is above FL195, there will be no perceptible impact to stakeholders on the ground	MET
DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Introduction of CDRs is fully compatible with FUA principles and will not impact MoD operations.	MET
DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	Changes to aircraft arriving/departing the London group airfields and aircraft overflying the UK will be contained above FL195. Therefore, no additional CAS will be required	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	This option provides additional connectivity for aircraft arriving/departing the London group airfields and aircraft overflying the UK at the London/ Amsterdam UIR Interface providing limited benefit for future FRA airspace	PARTIALLY MET
DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Connectivity to a new COP could have a minor operational impact to airspace users requiring some additional training.	PARTIALLY MET

Table 5: Design Principle evaluation of "Option 4a".

“Option 4a” Conclusion

The introduction of alternative connectivity for Overflights and London group traffic meets or partially meets all design principles. Whilst this option does provide connectivity to the new COP (DP4), this connectivity is minimal, aircraft arriving at/ departing UK airfields outside of this group are not considered. This limited connectivity also accounts for the partially met assessment of DPs 5, 6 and 11. However, the benefit assessed by these three DPs will increase with each additional Design Option implemented, becoming met if all 6 options are approved. Airspace users might require some additional training associated with the introduction of new connectivity (DP12) however this training will have minimal operational impact. For these reasons, “Option 4a” will be is progressed.

2.6 Option 5: Replication of Existing Night-Time Fuel Saving Routes for daytime use.

Design Principle Evaluation			
Option 5: Replication of Existing Night-Time Fuel Saving Routes for daytime use			Progress
Replication of Existing Night-Time Fuel Saving Routes for daytime use removing the time dependency of these routes. These routes could be used by ScTMA traffic and overflights.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	By providing connectivity to a new COP on the London/ Amsterdam interface, aircraft can realise the full FRA benefits within the Amsterdam UIR. Aircraft will be able to flight plan and fly more direct routes, resulting in improved efficiency within the airspace, reducing fuel burn and CO_2 emissions. This is inline with the CAP1711 known outcomes of airspace modernisation.	MET
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Operational resilience will be enhanced by ATC being able to pre-empt FRA trajectory planning for aircraft arriving/departing the ScTMA airfields and overflight traffic.	MET

DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	This option introduces connectivity for aircraft arriving/departing ScTMA airfields and aircraft overflying the UK. Aircraft arriving/ departing other UK airfields are not accommodated within this option.	PARTIALLY MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	This option reviews the connectivity for aircraft arriving/departing ScTMA airfields and aircraft overflying the UK. Aircraft arriving/ departing other UK airfields are not considered and will not realise the full benefits of FRA within the Amsterdam UIR.	PARTIALLY MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	This option provides limited improvements to the London/ Amsterdam UIR Interface and on its own but does not fully meet with MUACs requirements.	PARTIALLY MET
DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	By introducing connectivity to a new COP there will be a net reduction in CO_2 emissions per flight.	MET

DP8	Minimise environmental impacts to stakeholders on the ground.	As the change is above FL195, there will be no perceptible impact to stakeholders on the ground	MET
DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Introduction of CDRs is fully compatible with FUA principles and will not impact MoD operations.	MET
DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	Changes to aircraft arriving/departing the ScTMA airfields and aircraft overflying the UK will be contained above FL195. Therefore, no additional CAS will be required	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	This option provides additional connectivity for aircraft arriving/departing the ScTMA airfields and aircraft overflying the UK at the London/ Amsterdam UIR Interface providing limited benefit for future FRA airspace	PARTIALLY MET
DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Connectivity to a new COP could have a minor operational impact to airspace users requiring some additional training.	PARTIALLY MET

Table 6: Design Principle evaluation of "Option 5".

"Option 5" Conclusion

The introduction of connectivity for Overflights and London group traffic meets or partially meets all design principles. Whilst this option does provide connectivity to the new COP (DP4), this connectivity is minimal, aircraft arriving at/ departing UK airfields outside of this group are not considered. This limited connectivity also accounts for the partially met assessment of DPs 5, 6 and 11. However, the benefit assessed by these three DPs will increase with each additional Design Option implemented, becoming met if all 6 options are approved. Airspace users might require some additional training associated with the introduction of new connectivity (DP12) however this training will have minimal operational impact. For these reasons, "Option 4" will be is progressed.

2.7 Combined Options 1-5:

There are 63 possible combinations involving at least 1 of the design options as evaluated above. Stakeholders will be asked during consultation witch options to progress. For information a Design Principle Evaluation matrix (Met, Partial, Not Met) for all 63 options is shown in Annex A. Following consultation, any one of these combinations could be submitted as the final option in the stage 4 ACP submission. Each possible combination, bar implementation of all 6 options, when subjected to the design principle evaluation will result in the same evaluation outcome as the individual options although the benefit is expected to increase with each option implemented. However, if all six options were implemented concurrently, an apparent synergistic affect leads to qualitative evaluation below, shown for information, which fully meets all Design Principles bar DP12. This is a result of the possibility that airspace users might require some additional training associated with the introduction of the new connectivity (DP12) however this training will have minimal operational impact .

Design Principle Evaluation			
Combined Options 1-6			
Implementation of all 6 design options providing maximum connectivity to the new COP			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	By providing connectivity to a new COP on the London/ Amsterdam interface, aircraft can realise the full FRA benefits within the Amsterdam UIR. Aircraft will be able to flight plan and fly more direct routes, resulting in	MET

		improved efficiency within the airspace, reducing fuel burn and CO_2 emissions. This is in line with the CAP1711 known outcomes of airspace modernisation.	
DP3	The proposed airspace design will maintain or enhance operational resilience of the ATC network.	Operational resilience will be enhanced by ATC being able to pre-empt FRA trajectory planning for aircraft arriving/departing FRA within the Amsterdam UIR.	MET
DP4	The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.	Implementation of all 6 options introduces multiple connections to the new COP allowing optimised routings within the Amsterdam UIR.	MET
DP5	The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.	Implementation of all 6 options reviews the connectivity between the London and Amsterdam UIRs ensuring routes are optimised for Amsterdam FRA operations.	MET
DP6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control	Implementation of all 6 options provides a compatible interface with Maastricht Upper Area Control	MET

DP7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	By introducing connectivity to a new COP there will be a net reduction in CO_2 emissions per flight.	MET
DP8	Minimise environmental impacts to stakeholders on the ground.	As the change is above FL195, there will be no perceptible impact to stakeholders on the ground	MET
DP9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles	Introduction of CDRs is fully compatible with FUA principles and will not impact MoD operations.	MET
DP10	The proposed changes will be contained within the extant airspace i.e. above FL195 (no additional airspace required).	All options 1-6 are contained within existing CAS above FL195. Therefore, no additional CAS will be required	MET
DP11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	Implementation of all 6 options provides optimal connectivity for future FRA operations within the London FIR	MET
DP12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training	Connectivity to a new COP could have a minor operational impact to airspace users requiring some additional training.	PARTIALLY MET

Table 6: Design Principle evaluation if Options 1-6 were all implemented

3. High Level Qualitative Cost Assessment

The addition of new and revised connectivity to a COP implemented by MUAC within the Southern North Sea on the Amsterdam/ London UIR interface will provide more efficient routing options for aircraft operators to use. These routes should result in a net reduction in miles flown by aircraft with commensurate fuel and CO2 savings.

4. Conclusion and Shortlist

Using a single design concept, 6 design options have been proposed. These options can be implemented independently or as a combination. The maximum benefit can only be realised if all six options are implemented concurrently.

Any combination of these design options bar all 6 options implemented together results in no discernible difference in the qualitative evaluation against the design principles,

No individual design option or combination of options fully meets all the design principles.

All Design Options met the high priority design principles DP1- Maintain or enhance current levels of safety and DP2- Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.

All individual options only partially meet the following design principles:

- DP4- The proposed airspace design will produce connection to a new Reporting Point on the London/Amsterdam UIR Boundary to enable optimised routings within the Amsterdam UIR, which is operated as Free Route Airspace.
- DP5- The proposed airspace design will include a review of existing Upper Route connectivity between the London / Amsterdam UIRs (within the southern North Sea) to ensure environmental efficiency is optimised as a result of Free Route Airspace Operations in the Amsterdam UIR.
- DP6- The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control
- DP11- The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.
- DP12- The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training

Should all 6 options be implemented , as evaluated in Section 2.7, DPs 4,5,6 and 11 would be met. Only DP 12- *The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training*, would remain partially met. This is a result of any change being implemented might require some training.

All Options will be carried forward to consultation with stakeholders selecting which option or combination of options they would like to see implemented.

© 2021 NATS (En-route) plc

5. Annex A- Design Principle Evaluation Matrix for all option combinations

Options	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	DP12
Do Nothing												
1												
2												
3												
4												
4a												
5												
1, 2												
1, 3												
1, 4												
1, 4a												
1, 5												
2, 3												
2, 4												
2, 4a												
2, 5												
3, 4												

3, 4a												
3, 5												
4, 4a												
4, 5												
4a, 5												
1, 2, 3												
1, 2, 4												
1, 2, 4a												
1, 2, 5												
1, 3, 4												
1, 3, 4a												
1, 3, 5												
1, 4, 4a												
1, 4, 5												
1, 4a, 5												
2, 3, 4												
2, 3, 4a												
2, 3, 5												
2, 4, 4a												
2, 4, 5												

© 2021 NATS (En-route) plc

2, 4a, 5												
3, 4, 4a												
3, 4, 5												
3, 4a, 5												
4, 4a, 5												
1, 2, 3, 4												
1, 2, 3, 4a												
1, 2, 3, 5												
1, 2, 4, 4a												
1, 2, 4, 5												
1, 2, 4a, 5												
1, 3, 4, 4a												
1, 3, 4, 5												
1, 3, 4a, 5												
1, 4, 4a, 5												
2, 3, 4, 4a												
2, 3, 4, 5												
2, 3, 4a, 5												
2, 4, 4a, 5												
3, 4, 4a, 5												

© 2021 NATS (En-route) plc

1, 2, 3, 4, 4a												
1, 2, 3, 4, 5												
1, 2, 3, 4a, 5												
1, 2, 4, 4a, 5												
1, 3, 4, 4a, 5												
2, 3, 4, 4a, 5												
1, 2, 3, 4, 4a, 5												

End of document