Operational Service Enhancements Project: -
New Amsterdam / London UIR Crossing Point
ACP-2019-55

CAP 1616 Stage 4,

Step 4B Update and Submit ACP

Airspace Change Proposal

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References

Ref No	Description	Hyperlinks
1.	Airspace Change Portal: New Amsterdam/ London UIR Crossing Point	Link
2.	Statement of Need	Link
3.	Stage 1 Assessment Meeting Presentation	Link
4.	Stage 1 Assessment Meeting Minutes	Link
5.	Stage 1 Design Principles	Link
6.	Stage 2 Design Options and Evaluation	Link
7.	Stage 2 Design Options Appraisal	Link
8.	Stage 3, Consultation Strategy	Link
9.	Stage 3, Full Options Appraisal	Link
10.	Stage 3, Consultation Document	Link
11.	Stage 3, Collate and Review Responses (incorporating Step 4A Update Design)	Link
12.	CAP1616	Link
13.	Technical Definition Document WGS84	Supplied as part of ACP
14.	LOA NATS and Maastricht (agreed in principle)	Supplied as part of ACP
15.	Draft AIP changes	Supplied as part of ACP
16.	CAP584 Air Traffic Controllers - Training	Link
17.	Special Use Airspace - Safety Buffer Policy For Airspace Design Purposes	Link
18.	EU regulation No. 716/2014	Link

1. Contents

2. Introduction

2.1 The NATS En-Route Ltd. (NERL) Operational Service Enhancements Project (OSEP) is seeking to deliver changes across NERL airspace, delivering benefits through enabled fuel savings to customers, reduced routing inefficiency, safety improvements and alleviating capacity hotspots.

2.2 EU regulation No. 716/2014 (Ref 18) requires the implementation of Free Route Airspace (FRA) within upper airspace. Following the introduction of FRA and Flexible Use Airspace (FRA/ FUA) into the Amsterdam Upper Information Region (UIR), (above FL245) in December 2019. Maastricht Upper Area Control (MUAC) have subsequently requested the introduction of a new coordination/crossing point (COP) on the London/Amsterdam UIR boundary to facilitate the transfer of aircraft (Figure 1). The point RENEQ[1] was submitted to the International Codes and Routes Designators (ICARD) system (Created on ICARD 21/01/2022) and has the following rounded-coordinates 54°14'25"N 004°18'00"E.

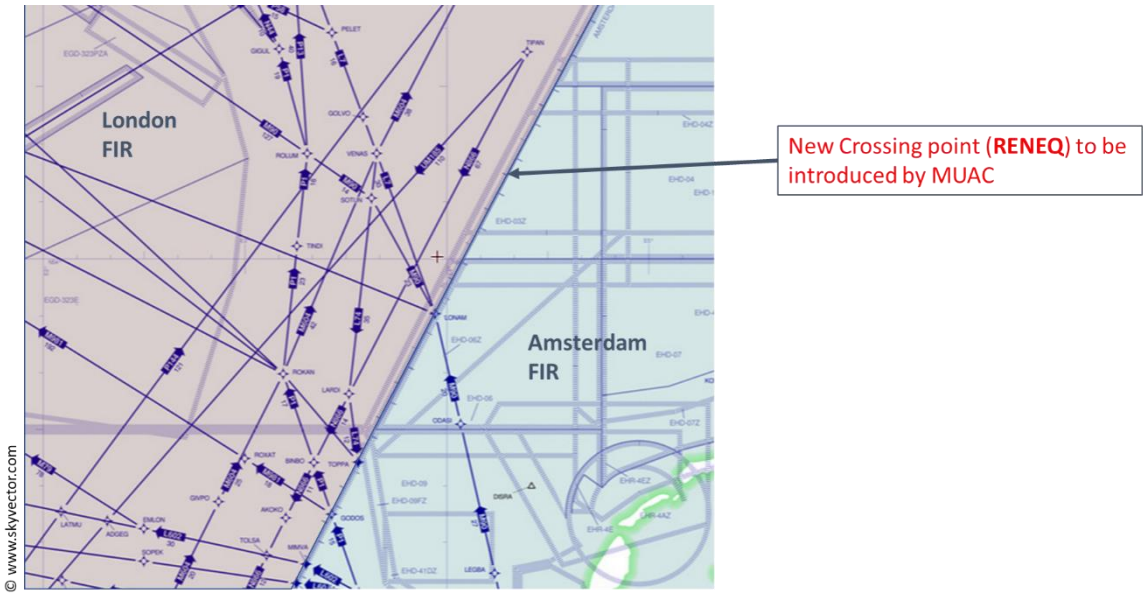

Figure 1: Location of new COP RENEQ to be introduced by MUAC

2.3 The introduction of this point will enable improved connectivity between the London and Amsterdam UIRs for aircraft operating above FL245 as a result of FRA within the MUAC Area of Responsibility, providing fuel savings and reducing CO_2e[2] emissions.

2.4 Whilst MUAC are able to introduce a new COP, RENEQ, on the UIR boundary, they are not able to provide connectivity within the UK UIR to this point. This connectivity requires the completion of an Airspace Change Proposal (ACP) via the UK Civil Aviation Authority's (CAA) CAP1616 process.

2.5 As part of the NERL OSEP, NATS have commenced an Airspace Change Proposal (ACP) to provide connectivity between the UK ATS route network and the new COP, RENEQ, as well as refining existing connectivity in the vicinity.

[1] The position of RENEQ has been determined by MUAC to align with the orientation of existing of SUAs contained within their Area of Responsibility.

[2] Carbon dioxide equivalent or CO_2e means the number of metric tons of CO_2 emissions with the same global warming potential as one metric ton of another greenhouse gas

3. Executive Summary

3.1 This ACP is being progressed as part of NERL's OSEP project. This project seeks to deliver changes across NERL airspace, delivering benefits through enabled fuel savings to customers, reduced routing inefficiency, safety improvements and alleviating capacity hotspots.

3.2 MUAC introduced FRA/ FUA into the Amsterdam UIR in December 2019.

3.3 Following their introduction of FRA/FUA, MUAC identified a need to improve the existing connectivity between the UK ATS Upper route network and the Amsterdam UIR by the addition of a new COP on the London/Amsterdam UIR boundary. This new point will facilitate improved transfer of aircraft between the two Air Navigation Service Providers.

3.4 MUAC are introducing this point, named RENEQ, at the UIR boundary but are unable to provide connectivity to the UK Air Traffic Services (ATS) Route Network.

3.5 This ACP proposes to introduce 5 new conditional routes; the extension of 3 existing routes; the alteration of 2 existing CDRs to make them bi-directional and thereby replicate existing nigh-time fuel saving routes (NTFSRs) so that they become available H24. This change will also make minor alterations to existing routes, including the addition of new waypoint WECOW (at the intersection of L7 and N866) to enable improved flight plan connectivity. As a consequence, these route changes will, subject to SUA activity within the southern North Sea, enable improved bi-directional connectivity via the new COP (RENEQ) in addition to already established COPs.

Secretary of State Call-In

3.6 Typically, the CAA is the decision maker in Airspace Change Proposals. However, the Secretary of State may determine that a proposal will be decided by him/her if a request is made to do so and any one of the below four Call-In criteria apply (Ref CAP1616 ed.4, Pg71 Para 251 et seq) if the proposed change:

- is of strategic national importance
- could have a significant impact (positive or negative) on the economic growth of the UK
- could both lead to a change in noise distribution resulting in a 10,000net increase in the number of people subjected to a noise level of at least 54 dB LAeq 16hr and have an identified adverse impact on health and quality of life, or
- could lead to any volume of airspace classified as Class G being reclassified as Class A, C, D or E.

3.7 The Secretary of State has provided statutory guidance on the meaning of these criteria. For this ACP NATS assess that none of these criteria apply.

4. Current Airspace Description

4.1 Structure and Routes, UK and Amsterdam UIR boundary

4.1.1 The current connectivity between the London and Amsterdam UIRs in the southern North Sea is shown in Figure 2.

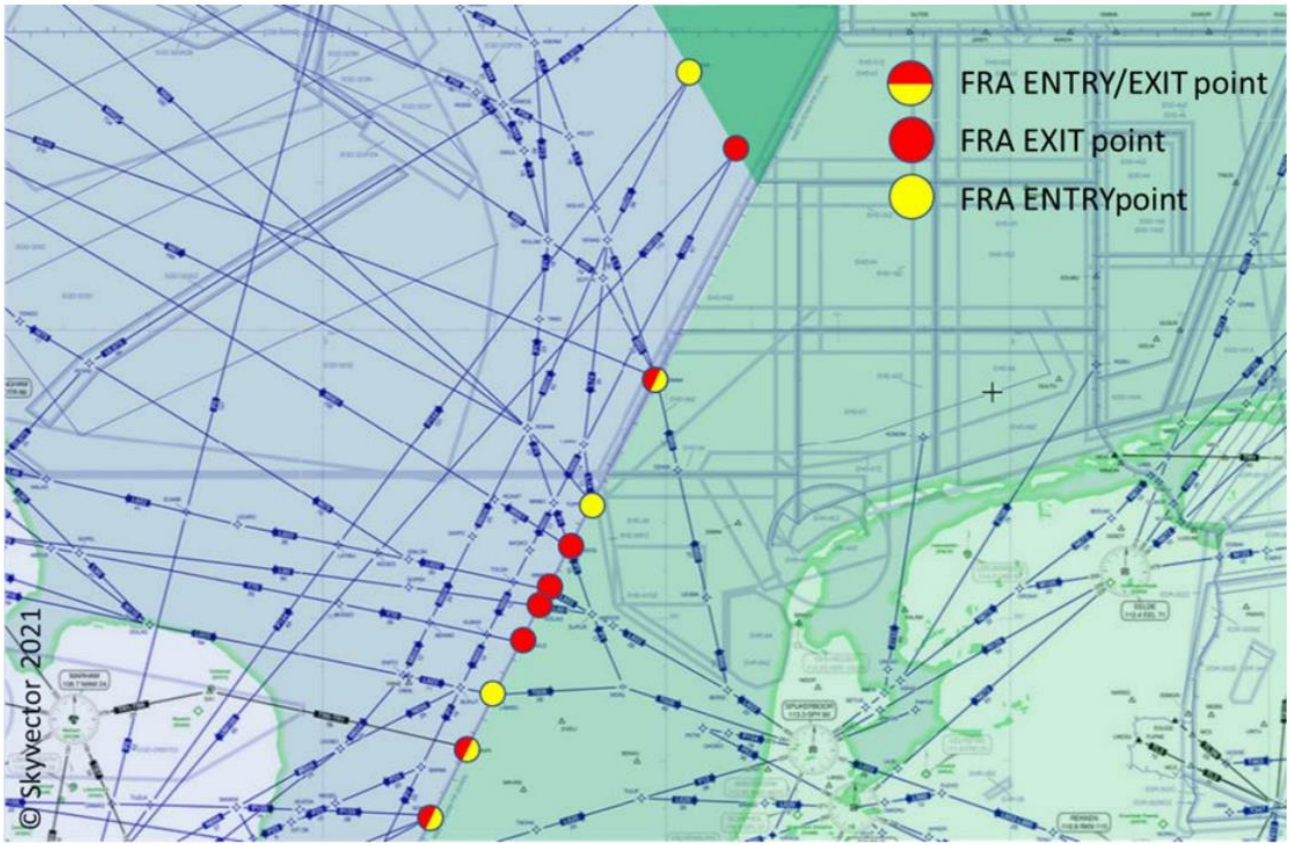

Figure 2: Current interface between the Amsterdam and London UIRs in the southern North Sea. Existing COP points are highlighted with the FRA role.

4.1.2 Aircraft operating East of the interface within MUACs area of responsibility (Light Green) or within the Scottish FRA D1 area (Dark Green) do so using FRA principles[3]. When leaving FRA (via a FRA Exit point) or entering (via a FRA Entry point), aircraft are required to do so via published COPs situated on the interface between the London and Amsterdam/ Scottish FRA D1 UIRs.

4.1.3 Aircraft operating within the London UIR do so by filing and flying routes following the UK ATS route network.

4.1.4 Currently aircraft are required to route towards a FRA entry or exit point before continuing their route. The current orientation of existing points on the UIR boundary results in aircraft flying additional track mileage, leading to increased fuel burn and CO_2e emissions, and limits the benefits of FRA within the MUAC area of responsibility.

4.1.5 To enhance the benefits of FRA within the Amsterdam UIR, MUAC are introducing an additional COP (RENEQ), north of LONAM, to the Amsterdam / London UIR interface. The introduction of RENEQ will provide a basis for future FRA deployments within the London UIR whilst allowing aircraft to fly shorter,

[3] Free Route Airspace is defined as "A specified airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) way points, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control."

more direct routes in the interim. This will increase the efficiency of the airspace within the Amsterdam UIR resulting in decreased fuel burn and CO_2e emissions.

4.1.6 The introduction of this new reporting point, RENEQ, by MUAC and the improved connectivity provided by this ACP will enable aircraft operators to take advantage of more efficient flight planning options with track mileage savings across the whole filed route[4], subject to Special Use Airspace (SUA) activity within both UIRs. These proposed options are provided in addition to the existing routes, thereby providing more options for operators to plan for the most expeditious route available.

4.1.7 Whilst all connectivity options could provide a benefit across the whole route, this benefit might be apportioned in the UK, Amsterdam or both UIRs. In some circumstances, aircraft might have a slight mileage and corresponding fuel and CO_2e emission disbenefit within the UK UIR; however, this will be offset by a greater benefit within the Amsterdam UIR, or vice versa.

4.1.8 The addition of this improved connectivity will not remove any existing flight planning options from the route network that operators currently use. It will provide aircraft operators with an increased number of route options allowing them to flight plan the most expeditious route available. It is expected that operators will flight plan the most direct, and therefore, shortest routes, subject to the prevailing wind direction and speed, and thus provide them with the maximum fuel and CO_2e benefits. It must be noted that FRA within the Amsterdam UIR enables this benefit. Actual trajectories planned within Amsterdam FRA will be determined by airspace users. As the existing routes will remain in addition to the proposed routes as flight plannable options, this change will not result in a fuel or CO_2e disbenefit for operators.

4.2 Airspace usage and proposed effect

4.2.1 Traffic Volumes and Patterns

4.2.2 A 2-week traffic sample, 3rd -16th August 2020, representing a busy period following the introduction of FRA within the Amsterdam UIR, of aircraft routing through the affected UK airspace above FL200 is shown in Figure 3.

[4] Track mileage savings might be made within the London UIR, Amsterdam UIR or both. Overall, the distance flown by an aircraft will remain the same or reduce when compared to the present-day scenario.

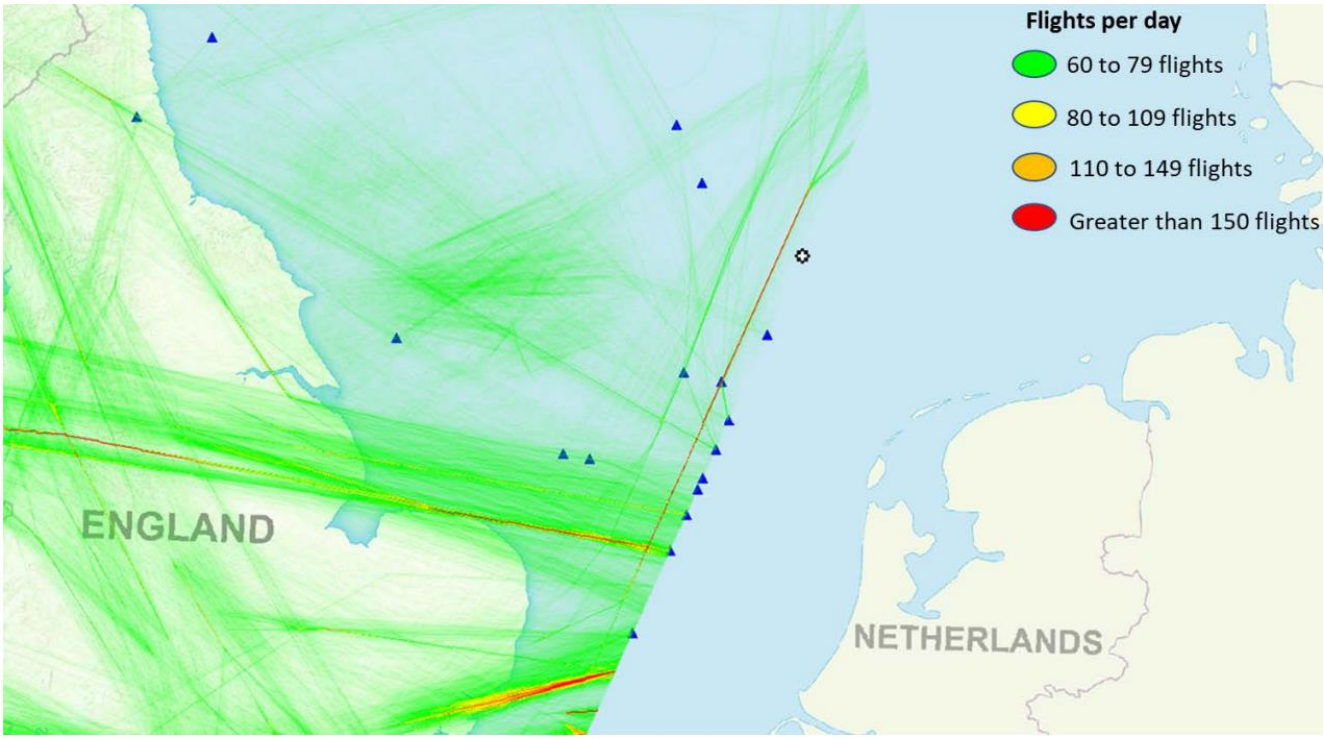

Figure 3: ATC Playback Trajectory Density plot showing aircraft routing through the airspace impacted by this change following the introduction of FRA within the Amsterdam UIR. Data is for all flights above FL200 for a 2-week period, 3rd -16th August 2020. Radar data is not available for aircraft within the Amsterdam UIR.

4.2.3 However, traffic volume in 2020 was heavily reduced by the Covid-19 pandemic. As such aircraft may have been more frequently issued tactical shortcuts resulting in aircraft flying non-standard routings. Figure 4 shows the same region for a single week[5], 5th -11th August 2019 (a busy period prior to Covid-19 and the implementation of FRA within the Amsterdam UIR) to provide a clearer indication of traffic volume and patterns within the impacted UK UIR region. Both Figure 3 and Figure 4 show a clear correlation between track density and the UK ATS route network, (shown in Figure 2).

[5] A single week from 2019 was used as traffic volumes were greatly increased. A longer time period could not be visualised due to the data size resulting from a larger traffic set.

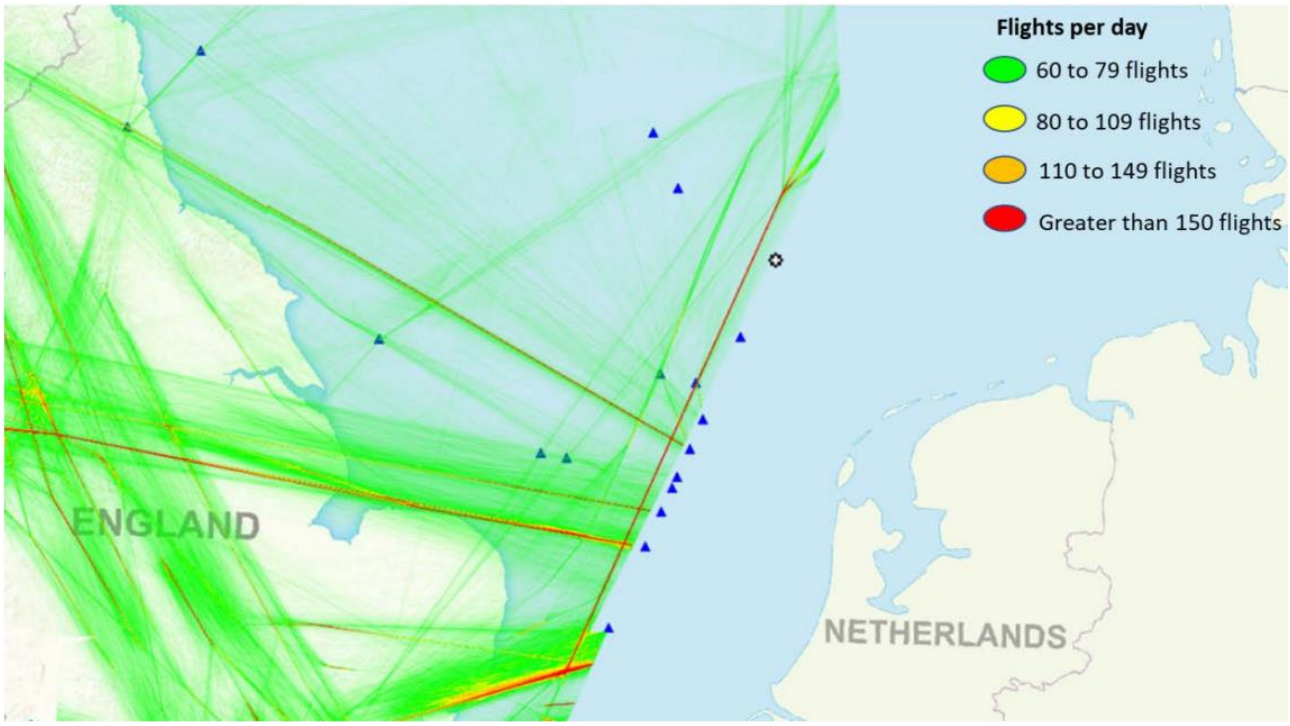

Figure 4: ATC Playback Trajectory Density plot showing aircraft routing through the airspace impacted by this change prior to the introduction of FRA within the Amsterdam UIR. Data is for all flights above FL200 for the period 5th – 11th August 2019. Radar data is not available for aircraft within the Amsterdam UIR.

4.2.4 FRA was introduced within the Scottish UIR in December 2021. To date, radar data is unavailable to demonstrate the change this has had on traffic within the impacted area.

4.2.5 Current and Forecast Traffic Numbers

4.2.6 Following the July 2021 workshop, the European Union Network Manager (EU NM) analysed 2 days of traffic from 2019 for flights which could have elected to flight plan via this new COP, if the proposed airspace change (to introduce 5 new conditional routes, extend 3 existing routes, and alter existing CDRs to make them bi-directional, as shown in Figure 5 and discussed in section 6.2), had been available.

4.2.7 1 weekday (5th July 2019) and 1 weekend day (5th May 2019) were selected to demonstrate the potential use of this airspace change. These dates were provided to account for the different traffic patterns operating midweek vs the weekend, and SUA activations which are prevalent on weekdays. Additionally, these specific days were used as they included a northerly North Atlantic Track flow i.e., they captured European to North America flights crossing the area and this could then be used to model usage and ensure the design options were optimised. The EU NM provided NATS with the results of this analysis as well as the traffic sample used. NATS analytics have used this data to forecast the number of flights which could flight plan via this COP between 2022, the year following implementation, and 2032, 10 years post implementation and included the fleet make up based upon 2019 data (see Table 1). This forecast makes the following assumptions:

- The days provided represent typical midweek/weekend use
- Traffic has been grown/shrunk using approved forecast models
- Northerly North Atlantic (NAT) Tracks account for approximately 40% of the yearly European to North American flow orientation
- Aircraft will flight plan the most direct routings available. As aircraft are expected to flight plan via the most efficient route available, either new or extant, there will be no disbenefit attributed to this change

- Special Use Airspace (SUA) activations within the London and Amsterdam UIR will continue to be a feature of weekday operations (However, it is not possible to predict danger area activations in advance i.e., over the course of a 10-year period)[6]
- Growth between 2022 and 2032 is assumed to be linear

Year	Flight Count	Aircraft Types (%)[7]			
2022	38,039	B738 (30.5)	B744 (2.2)	A21N (0.6)	C17 (0.4)
2023	40,480	A320 (10.4)	B788 (2.2)	BCS3 (0.6)	B753 (0.2)
2024	42,922	A319 (6.4)	B748 (1.9)	CL60 (0.6)	B764 (0.2)
2025	45,363	A321 (5.9)	B752 (1.6)	DH8D (0.6)	C56X (0.2)
2026	47,804	B77L (4.4)	CRJ9 (1.4)	GLF6 (0.6)	E145 (0.2)
2027	50,246	A20N (4.2)	A388 (1.2)	A343 (0.4)	LJ45 (0.2)
2028	52,687	A359 (3.6)	A333 (1.0)	C25B (0.4)	MD11 (0.2)
2029	55,128	B763 (3.6)	A346 (1.0)	C680 (0.4)	TBM7 (0.2)
2030	57,569	B772 (3.6)	A332 (0.9)	E35L (0.4)	
2031	60,011	B789 (3.2)	GL5T (0.8)	FA7X (0.4)	
2032	62,452	B77W (2.5)	GLEX (0.8)	J328 (0.4)	

Table 1: Forecast traffic numbers which could flight plan via proposed new connectivity between 2022 and 2032 as well as aircraft types and percentage utilising this airspace

4.2.8 The assumptions used to forecast traffic numbers post implementation mean that the actual number of aircraft utilizing this new connectivity post implementation is likely to be lower than the one presented. This is a result of the proposed connectivity not necessarily being available the whole time due to periods of SUA activity. Route usage will also be lower when the northerly NAT tracks are not in use. It is anticipated that operators will flight plan via the most efficient route available and therefore the option consulted upon will result in no increase in fuel burn or CO_2e emissions over the current day operation.

4.3 Operational efficiency, complexity, delays and choke points

4.3.1 Connectivity will be provided to new point RENEQ to facilitate more efficient use of airspace within the Dutch UIR as well as providing associated and enhanced connectivity within the London UIR.

4.3.2 The location of SUAs in the southern North Sea within UK and Dutch airspace means new connectivity between the UIR interface and the UK ATS route network will either route through or towards Danger

[6] A single week from 2019 was used as traffic volumes were greatly increased. A longer time period could not be visualised due to the data size resulting from a larger traffic set.

[7] Aircraft types are provided as a percentage based on the data provided by the EU NM. It is assumed there will be no change in the fleet makeup from the 2019 data.

Areas within UK and Dutch airspace. Therefore, any new route availability must be dependent on Danger Area activity. Hence, the proposed changes are CDRs[8].

4.3.3 The distance a permanent route can be placed from the edge of any existing danger area is defined in the CAA policy: Special Use Airspace - Safety Buffer Policy For Airspace Design Purposes (Ref 17). The existing permanent route network within the southern North Sea is designed in conformance with this policy. The proposed changes also ensure conformance to this policy.

4.3.4 The changes within this option will provide additional connectivity between the London and Amsterdam UIRs through the introduction of a new COP and associated connectivity. This additional route connectivity will lead to an increased capacity by providing additional flight planning options and reducing traffic conflictions. Improved FRA trajectory planning will benefit ATC and Aircraft Operators by increasing the resilience of the ATC Network.

4.4 Safety Issues

4.4.1 NATS' first priority is safety (and transparently demonstrating its commitment to safety).

4.4.2 There are no specific safety issues within this area of airspace, in the current operation, to be solved by this proposal.

4.4.3 However, by providing additional connectivity at the UK/Amsterdam UIR interface, the benefits of FRA within Dutch airspace will be enhanced whilst providing an improved distribution of aircraft at the UIR interface. This will increase safety and airspace capacity whilst helping to prepare the UK airspace and NATS Air Traffic controllers (ATCOs) for future FRA deployments.

4.4.4 Section 10 contains further details on the safety assessment for this proposal.

4.5 Environmental Issues

4.5.1 Improving the connectivity at the UK/Amsterdam UIR interface will allow for more effective use of FRA within Dutch airspace thereby enabling greater utilisation of airspace currently made unavailable by the existing route connections offered in UK airspace. Consequently, the reduction in track mileage across the entire flight as well as the associated reduction in CO_2e emissions is the primary driver for this proposed change.

4.5.2 An analysis of the environmental impact of the proposed changes is given in section 7.7.This includes an analysis comparing the track mileage saving of the proposed change compared to the 'DO NOTHING' baseline in Table 3[9].

[8] A CDR is defined as "A non-permanent ATS route or portion thereof which can be planned and used under specified conditions."

[9] These values only cover the UK portion of the route; they do not provide insight into the net track mileage over the entire route. A reduction in UK track mileage might be enabled by an accompanying increase in track mileage within the Amsterdam FRA or vice versa. Thus, a comparison of the track mileage saving in UK airspace alone does not provide the net track mileage difference for the whole route.

Stage 2 Option	Proposed Route	Proposed Routing	Alternate existing route	Track Mileage Comparison (NM)	UK SUA Transited	Remarks
1	UP59	RENEQ-ASKAM	GODOS-P1-ROLUM-P13-ASKAM	-45.2	N/A	UP59 Route Extension To provide connectivity to EGPX FRA
			LONAM-L7-ASKAM	-12.4		
1	P58	RENEQ-NR2-PELET-P58-ODMOS	GODOS-P1-GIGUL-N44-ODMOS	-38.7	N/A	P58 Route Extension To provide connectivity to EGPX FRA
			LONAM-L7 PELET-P58-ODMOS	-11.6		
2	P38	RENEQ-NR3-ROBEM	GODOS-P1-ROKAN-M982-ROBEM	-11.3	EGD-323A EGD-323M EGD-323N EGD-323P	New Route P38 To provide connectivity to EGPX FRA.
2	Y96	RENEQ-NATEB	GODOS-M981-NATEB	+1.6	EGD-323A EGD-323M EGD-323N EGD-323P	Y96 Route Extension. For overflights and ScTMA arrivals and departures Whilst this route produces a small increase in track mileage within the London UIR it reduces overall track mileage in the Amsterdam UIR providing a net benefit.
			LONAM-N610-NATEB	+1.7		
3	P39	RENEQ-ROVNI	ROPAL-UL975-ROVNI	-12.7	EGD-323D EGD-323E	New Route P39. Bi-directional for aircraft arriving and departing Manchester/ Midland Group airfields and Dublin.
4/4a	P40	RENEQ-ROKAN-ADGEG	TIPAN-UM185-ADGEG	-20.4	EGD-323E between ADGEG and ROKAN	New Route P40. Bi-directional for aircraft overflying the UK via UM185 and P144 or exiting the London UIR following departure from the LTMA via M604.
4/4a	P48	ROKAN-LATMU	No existing connectivity	N/a	EGD-323E	New Route P48 To provide connection to P40 at ROKAN and onward connectivity at the UIR interface
4	P43	LONAM - LARDI	No existing connectivity	N/a	N/a	New Route P43 Unidirectional for aircraft entering the London UIR providing additional connectivity at the UIR interface
5	M982	Make Bi-directional	N/a	N/a	EGD-323E EGD-323D EGD-323C EGD-323B EGD-323A	To emulate NTFSRs and provide flight plan connection and bidirectional use on a H24 basis subject to SUA activity
5	N97					
5	P1					
5	M981					

Table 3: Comparison between the existing SRD routes and the proposed additional routes this ACP seeks to implement

4.5.3 Additionally, the track mileage savings for 3 popular city pairs impacted by this change are shown in Table 4[10]. CO_2e savings are directly related to track mileage and therefore a reduction in track mileage will have a corresponding reduction in CO_2e emissions.

5. Statement of Need

5.1 To enhance the benefits of FRA within the Amsterdam UIR, MUAC have requested an additional COP, north of LONAM, be added to the Amsterdam/ London UIR interface. This additional COP will allow aircraft to fly shorter routes, increasing the efficiency of the airspace within the Amsterdam and London UIRs, resulting in decreased fuel burn and CO_2e emissions. The following text is taken from the DAP1916 Statement of Need (Ref 2) submitted in July 2019 for this airspace change proposal.

As part of the introduction of Free Route and Flexible Use Airspace within the Amsterdam Upper Information Region, Maastricht Control have requested the introduction of a new crossing point on the London/Amsterdam boundary to facilitate the transfer of aircraft. This ACP aims to introduce route connectivity to this new reporting point in order to provide improved environmental efficiency. In addition, a review of existing routes between the London/Amsterdam UIR (in the southern North Sea area) will be undertaken to ensure optimal connectivity is provided.

Due to the nature of the request from Maastricht, design options for connection to the new reporting point will be limited; however, all options will be located over the North Sea approximately 150 nm from the UK coast and above 20,000 ft.

5.2 The proposed change will provide the connectivity between the Amsterdam and London UIRs following introduction of the new crossing point by MUAC in December 2022 (AIRAC 2212). This will enable improved environmental savings ahead of the introduction of Free Route Airspace (FRA) within this area of the London UIR.

5.3 Justification & Anticipated Benefits

This ACP will enable the following benefits:

- Additional connectivity at the interface of the London and Amsterdam UIRs providing an improved distribution of aircraft at the UIR interface.
- More direct trajectories across the entire flight within upper airspace will have a positive impact on airline operations.
- A net reduction in fuel burn and the associated CO_2e emissions per flight will have a positive environmental benefit.
- Increased safety and airspace capacity whilst helping to prepare the UK airspace and NATS Air Traffic controllers (ATCOs) for future FRA deployments.

6. Proposed Airspace Description

6.1 Objectives for Proposed Design

[10] Each city pair will have a different track mileage saving and therefore it is not proportional to provide an overall CO_2 saving.

6.1.1 The objective for the proposed design presented herein is to provide connectivity between the UK ATS route network and the new COP, RENEQ, introduced by MUAC. Additionally, this ACP will amend the existing connectivity, providing improved environmental efficiency with this airspace area.

6.2 Proposed New Airspace/ Route Definition and Usage

6.2.1 The proposed changes will introduce 5 new conditional routes, extend 3 existing routes, and alter existing CDRs to make them bi-directional and thereby replicate existing NTFSRs so that they become available H24. The change will also make minor alterations to existing routes to enable flight plan connectivity. As a consequence, these route changes will, subject to SUA activity within the southern North Sea, enable improved bi-directional connectivity via the new COP (RENEQ) in addition to already established COPs.

6.2.2 The new and extended routes proposed (NR 1-8) as well as the NTFSRs with proposed changes are shown in Figure 5 and Table 3.

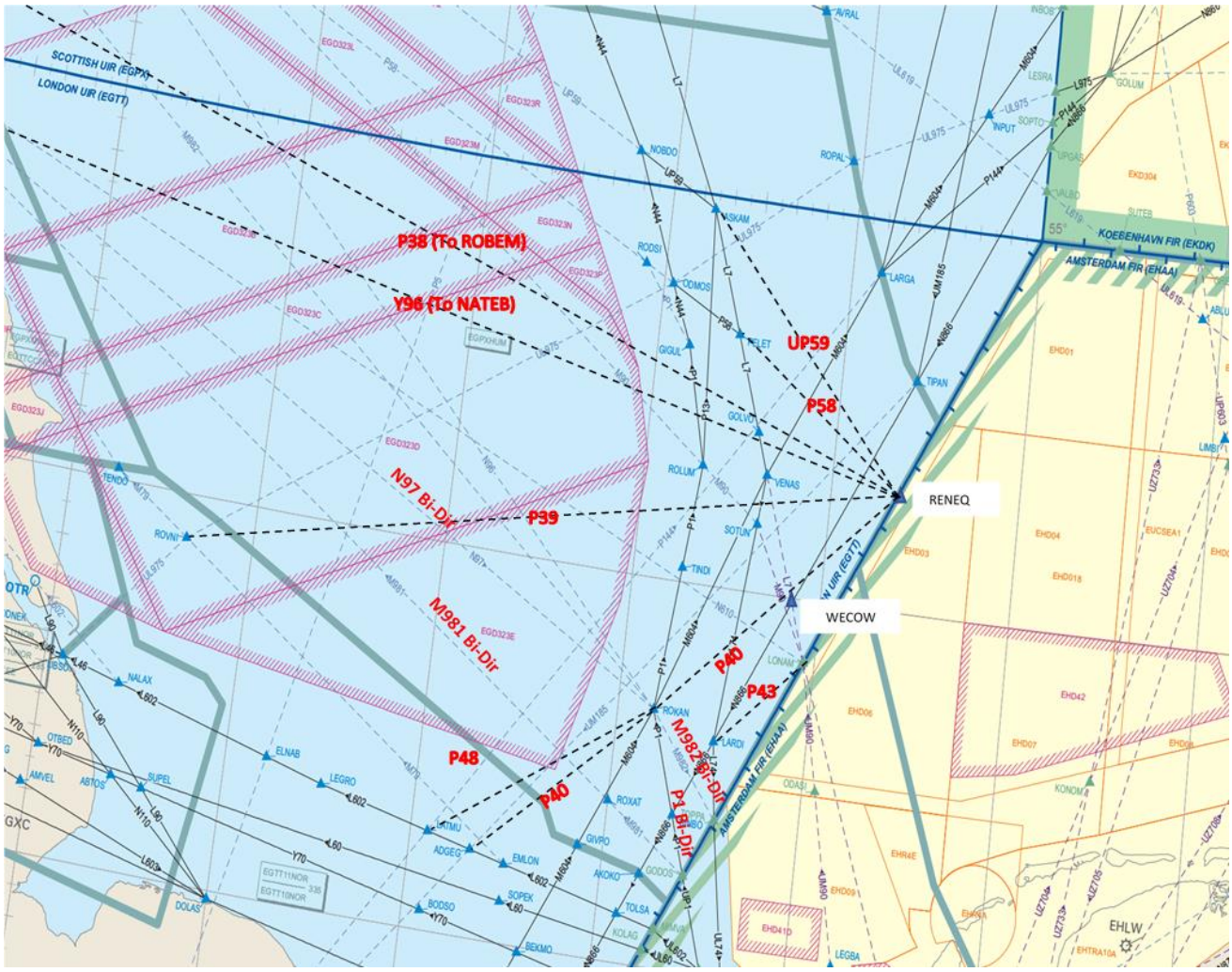

Figure 5: To provide connectivity between UK ATS routes and the new COP RENEQ introduced by MUAC, the proposed option introduces 5 new conditional routes, P38 (RENEQ – NR3 – ROBEM), P39 (RENEQ – ROVNI), P40 (RENEQ – ROKAN – ADGEG), P48 (ROKAN – LATMU) and P43 (LONAM – LARDI); extends 3 existing routes, UP59, P58 and Y96; alters the existing CDRs, M982, N97, P1 and M981, providing flight plan connection and bi-directional use on a H24 basis (subject to SUA activity) and replicating existing night-time fuel saving routes (NTFSRs); and introduces new waypoint WECOW (at the intersection of L7 and N866).

6.2.3 A summary of NATS Validation simulations for this change will be provided to the CAA (Sup No. 1) which indicates that air traffic controllers are confident that the proposed airspace changes are fit-for-purpose.

6.2.4 The following technical documents provide further information on the proposed designs:

- A technical definition document which contains the WGS84 data in excel format. This contains information on ATS routes such as levels, route designators and significant waypoint names (Ref 13)
- A document summarising the draft AIP changes. This lists the changes alongside the AIP pages where these changes need to occur (Ref 15)

6.2.5 Staffing requirements (presuming approval)

6.2.6 The following statements presume approval and subsequent implementation of this proposal.

6.2.7 A comprehensive Operational Conversion Training (OCT) activity is planned as part of the transition from the current to the proposed airspace arrangements and operating procedures. This activity will support air traffic controller familiarisation training, in the order of 70 air traffic controllers at NATS, and requires the use of the NATS simulator facility. The details will be forwarded to the ATS inspector in accordance with CAP584 (Ref 16).

6.2.8 The briefing and training activities will enable these operational staff to operate the new airspace arrangements and associated change in procedures, and the plan and its progress will be reviewed internally and by the CAA as part of their overall safety oversight and assurance responsibilities. Oversight of this element is undertaken by the ATS Inspector.

6.2.9 Appropriately qualified staff will be in place to manage the operation presuming approval and implementation of this proposal.

7. Impacts and Consultation

7.1 Consultation Summary

7.1.1 NATS completed engagement activities with stakeholders identified as those most likely to be affected by the proposed design. These stakeholders are listed in Appendix section 15.2. The Consultation Strategy document (Ref 8) details all the engagement activities completed prior to the consultation going live.

7.1.2 NATS commenced consultation on the proposed airspace changes presented herein on 3rd March 2022. The consultation was conducted via an online portal where users could submit a formal response alongside viewing the Consultation Document (Ref 10). The Consultation Document provides an overview of how the consultation was administered; an overview of the current airspace; the proposed changes and impacts of the proposed changes.

7.1.3 The consultation was open for 6 weeks, closing on the 14th April 2022. A total of 6 responses were received during this period. which are covered in the following sections. The responses received were in support of/no comment to (neither support nor object), the proposed changes, and no responses suggested changes to the proposal (Ref 11).

7.1.4 A full summary of how the consultation was run and the theming of all responses can be found in the Step 3D Collate and Review Responses (incorporating Step 4A Update Design) document, (Ref 11).

7.2 Net impacts summary for proposed change

7.2.1 The net impacts summary for the proposed change is shown in Table 2 below.

Category	Impact	Evidence
Safety/Complexity	Increase Safety through improved distribution of aircraft at the UIR interface	See section 4.4 and section 10
Capacity/Delay	Increase Airspace Capacity through improved distribution of aircraft at the UIR interface	See section 7.9 and paragraph 4.3.4
CO_2 emissions	Reduction in CO_2e emissions through an enabled reduction in track mileage	See section 7.7
Fuel Efficiency	Reduction in fuel burn through an enabled reduction in track mileage	See section 7.7 and section 7.9
Noise – Leq/SEL	No impact, this is a Level 2B Change	See section 7.8
Tranquillity, visual intrusion (AONBs & National Parks)	No impact, this is a Level 2B Change	See section 7.8
Local Air Quality	No impact, this is a Level 2B Change	See section 7.8
Other Airspace Users	This proposal only affects flights above FL245. All affected users and stakeholders have been engaged and consulted with.	See sections 7.4, 7.5, 7.6

Table 2: Net impacts summary for proposed change

7.3 Units affected by the proposal

7.3.1 This change will provide additional flight-planning options, only impacting stakeholders operating above FL245 within the affected region of the southern North Sea.

7.3.2 During Stage 1 of this process, 12 Design Principles were created and used to evaluate the design options. These can be found in the Step 1B Design Principle Document (Ref 5). Design Principle 4 (DP4) stated that "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" which this option meets. This change is coordinated with MUAC to align the associated cross border activities.

7.3.3 NATS specifically targeted Maastricht Upper Area Control which operates as the Air Navigation Service Provider (ANSP) for the Dutch airspace which the new COP links to, and alongside NATS, is the other ANSP impacted by this change. A response was received from MUAC supporting this ACP. Other units, not specifically contacted, were welcome to respond; one unit response was received from the German ANSP, Deutsche Flugsicherung GmbH (DFS).

7.3.4 Engagement with MUAC has continued throughout Stage 4 to inform validation activities and the development of the LOAs (Ref 14).

7.4 Military impact and consultation

7.4.1 Design Principle 9 (DP9) stated that "The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles", which this option meets.

7.4.2 All MoD stakeholders were consulted via DAATM. The MoD responded to the consultation that they had no objections to the proposal.

7.5 General Aviation airspace users impact and consultation

7.5.1 Design Principle 10 (DP10) stated that "The proposed changes will be contained within the extant airspace i.e., above FL195 (no additional airspace required)", which this option meets. As the airspace

change is contained above FL245[11] there will be no discernible impact on General Aviation (GA) operations.

7.5.2 As the perceived impact on the GA community was negligible, only 4 relevant GA NATMAC representatives were targeted; 1 response of 'No Comment' (neither support nor object) was received from Aircraft Owners and Pilot Association (AOPA).

7.5.3 NATS would have welcomed a response from any individual or organisation that considered themselves to be impacted by the change. No other responses from the GA community were received.

7.6 Commercial air transport impact and consultation

7.6.1 This airspace change provides additional flight planning options for operators, allowing them to choose the most direct, and therefore shortest routes subject to upper wind direction and speed and thus provide them with the maximum CO_2e benefits.

7.6.2 NATS has targeted the following NATMAC Commercial Air Transport (CAT) representatives; Airlines UK; British Airline Pilots Association (BALPA); British Airways (BA); Low Fare Airlines, and Heavy Airlines as detailed in Appendix section 15.2. Of the 5 NATMAC CAT representatives targeted, no responses were received.

7.6.3 In addition, the following airlines were targeted: KLM, Ryan Air, Lufthansa, Delta Airways, Scandinavian Airlines, British Airways, Norwegian Air International, easy Jet, United Airlines and Norwegian Air Shuttle. One response was received from easyJet, who responded in 'Support' of this proposal.

7.7 CO_2 environmental analysis impact and consultation

7.7.1 This airspace change will provide new flight planning options in addition to the existing connectivity and therefore will not lead to an environmental disbenefit.

7.7.2 This change will provide connectivity to a new COP, RENEQ, being introduced by MUAC, as well as reviewing existing connectivity between the London and Amsterdam UIRs. The new connectivity will provide additional flight planning options for operators, allowing them to choose the most direct, and therefore shortest routes, subject to upper wind direction and speed, and thus provide them with the maximum CO_2e benefits for the entirety of the flight. Considering this fact, this change will have no negative impact on CO_2e emissions. Therefore, in line with CAP 1616 guidance on proportionality, this has been assessed qualitatively.

7.7.3 The track mileage saving within UK airspace of the proposed new routes compared to the baseline is shown in Table 3. However, these values only cover the UK portion of the route; they do not provide insight into the net track mileage over the entire route. A reduction in UK track mileage might be enabled by an accompanying increase in track mileage within the Amsterdam FRA or vice versa. Thus, a comparison of the track mileage saving in UK airspace alone does not provide an accurate representation of the saving enabled by this change for the whole route.

7.7.4 Therefore, the track mileage savings for 3 popular city pairs impacted by this change are shown in Table 4, to demonstrate the potential savings. CO_2e savings are directly related to track mileage and therefore a reduction in track mileage will have a corresponding reduction in CO_2e emissions.

[11] In the UK, the airspace above FL195 is Class C airspace.

Stage 2 Option	Proposed Route	Proposed Routing	Alternate existing route	Track Mileage Comparison (NM)	UK SUA Transited[12]	Remarks
1	UP59	RENEQ-ASKAM	GODOS-P1-ROLUM-P13-ASKAM	-45.2	N/A	UP59 Route Extension To provide connectivity to EGPX FRA
			LONAM-L7-ASKAM	-12.4		
1	P58	RENEQ-NR2-PELET-P58-ODMOS	GODOS-P1-GIGUL-N44-ODMOS	-38.7	N/A	P58 Route Extension To provide connectivity to EGPX FRA
			LONAM-L7 PELET-P58-ODMOS	-11.6		
2	P38	RENEQ-NR3-ROBEM	GODOS-P1-ROKAN-M982-ROBEM	-11.3	EGD-323A EGD-323M EGD-323N EGD-323P	New Route P38 To provide connectivity to EGPX FRA.
2	Y96	RENEQ-NATEB	GODOS-M981-NATEB	+1.6	EGD-323A EGD-323M EGD-323N EGD-323P	Y96 Route Extension. For overflights and ScTMA arrivals and departures Whilst this route produces a small increase in track mileage within the London UIR it reduces overall track mileage in the Amsterdam UIR providing a net benefit.
			LONAM-N610-NATEB	+1.7		
3	P39	RENEQ-ROVNI	ROPAL-UL975-ROVNI	-12.7	EGD-323D EGD-323E	New Route P39. Bi-directional for aircraft arriving and departing Manchester/ Midland Group airfields and Dublin.
4/4a	P40	RENEQ-ROKAN-ADGEG	TIPAN-UM185-ADGEG	-20.4	EGD-323E between ADGEG and ROKAN	New Route P40. Bi-directional for aircraft overflying the UK via UM185 and P144 or exiting the London UIR following departure from the LTMA via M604.
4/4a	P48	ROKAN-LATMU	No existing connectivity	N/a	EGD-323E	New Route P48 To provide connection to P40 at ROKAN and onward connectivity at the UIR interface
4	P43	LONAM - LARDI	No existing connectivity	N/a	N/a	New Route P43 Unidirectional for aircraft entering the London UIR providing additional connectivity at the UIR interface
5	M982	Make Bi-directional	N/a	N/a	EGD-323E EGD-323D EGD-323C EGD-323B EGD-323A	To emulate NTFSRs and provide flight plan connection and bidirectional use on a H24 basis subject to SUA activity
5	N97					
5	P1					
5	M981					

Table 3: Comparison between the existing SRD routes and the proposed additional routes this ACP seeks to implement

[12] SUAs activity east of the UIR boundary within the Dutch UIR could impact the availability of the proposed and extended CDRs.

7.7.5 The track mileage savings for 3 popular city pairs impacted by this change are shown in Table 4.

Route	Baseline Track Mileage (NM)	Estimated Track Mileage via the new routes (NM)	Estimated Reduction in Track Mileage (NM) from baseline
EGLL to ESSA	832.1	831.5	0.6
EKCH to EGCC	571.5	566.2	5.3
KORD to EDDF	3779.7	3777.2	2.5

Table 4: Track mileage savings for 3 popular city pairs impacted by this ACP

7.7.6 Aircraft trajectories will be defined by their FRA entry/exit point as well as being impacted by any applicable SUA activity. Owing to the large number of possible route combinations, it would not be proportional to attempt to quantify the potential mileage savings for every flight. Fuel burn and CO_2e emissions are proportional to the actual distance an aircraft flew. Any reduction in track mileage will have a corresponding reduction in fuel burn and CO_2e emissions. It would be of no benefit for stakeholders to provide fuel and CO_2e savings for the UK portion alone as this could provide a distorted figure of the overall benefit. This figure would provide no indication of any benefit or disbenefit resulting from the change in track mileage within the Amsterdam UIR.

7.7.7 In line with CAP 1616 requirements for a Level 2B change with no negative fuel or CO_2e impact, (Ref 12) this saving has not been quantified; a WebTAG analysis has not been provided. However, the impact has been assessed qualitatively; any impact on fuel and CO_2e is proportional to the track mileage saving, and therefore a reduction in track mileage should have a corresponding reduction in fuel burn and CO_2e emissions.

7.7.8 This is assured as this change provides options in addition to existing routings and operators will be free to plan, subject to the prevailing wind direction and speed, the most efficient route available to them.

7.8 Local environmental impacts and consultation

7.8.1 The proposed revised airspace structure at the London/Amsterdam UIR interface would occur at a high level, above FL245, within existing Controlled Airspace over the southern North Sea. This proposal has therefore been captured as a Level 2B ACP. As such, there will be no change in impact to the local environment, which is not currently affected, and NATS did not target organisations whose primary interest is environmental impacts such as noise, visual intrusion, tranquillity or local air quality.

7.9 Economic impacts

7.9.1 This change is driven by enabling environmental savings through more efficient routings. This will be realised through the enabled enhancement of the FRA benefits within the Amsterdam UIR as well as improved routing options within the London UIR that this change enables.

7.9.2 Whilst this airspace change would lead to an increase in effective capacity, which in turn would lead to a positive economic impact, this change is not driven by the need to increase capacity and therefore this has not been quantified.

7.9.3 The predominant economic benefit relating to this proposal is an annual reduction in fuel burn for airlines, from additional connectivity between the London and Amsterdam UIRs. This new connectivity will provide additional flight planning options for operators, allowing them to choose the most direct, and therefore shortest routes, subject to upper wind direction and speed, and thus provide them with the maximum fuel burn benefit.

7.9.4 The new routes introduced by this change are in addition to the existing routes. As operators are anticipated to flight plan the most efficient route available to them, subject to prevailing wind direction and speed, it will not have a negative impact on fuel burn or CO_2e emissions. Therefore, in line with CAP1616 requirements (Ref 12) for a Level 2B change, this impact has not been quantified; a WebTAG analysis has not been provided. Instead, this has been demonstrated qualitatively using the track mileage for 3 popular city pairs, see Table 4.

8. Analysis of Options

8.1 Airspace Change Design Options

8.1.1 In 2019 MUAC contacted NATS to discuss the introduction of a new COP point on the London / Amsterdam UIR interface following the introduction of FRA within the Amsterdam UIR. Following these discussions NATS commenced this ACP to provide connectivity between the UK ATS route network and the new COP, RENEQ, being introduced by MUAC, as well as improving connectivity between the London and Amsterdam UIRs.

8.1.2 On 1st July 2021 a workshop was undertaken between Subject Matter Experts (SMEs) from NATS and MUAC as well as the European Union Network Manager (EU NM) to consider how best to provide this connectivity. This workshop produced 10 different options for how to improve the connectivity between the London and Amsterdam UIRs.

8.1.3 A "Do nothing" option was used as comparison for any design options developed.

8.1.4 During the Stakeholder workshop, a single "Preferred" option, Option 6, was identified. This option was a combination of the beneficial options 1, 2, 3, 4, 4a and 5.

8.1.5 The "Preferred" option uses the design concept of CDRs to improve the connectivity between the London and Amsterdam UIRs in the Southern North Sea.

8.1.6 The "Preferred" option was refined prior to consultation following SME input during NATS development simulations. The simulations identified that inclusion of a proposed new point in its planned location introduced safety concerns, see the Stage 3 Consultation Document (Ref 10). However, moving the point to where L7 and N866 cross, provides additional flight plan connectivity and removes the safety concern. This new point has been included and will be named WECOW.

8.2 Design Options Assessment

8.2.1 10 Design Options (1, 2, 3, 4, 4a, 5, 6, 7, 8, 9) were developed in Step 2A of the CAP1616 airspace change process (Ref 6). These options were shared with our stakeholders and, along with a "Do nothing" option, evaluated against 12 Design Principles (DPs) which covered a variety of criteria associated with the change, such as safety or environmental factors. These DPs have been listed in section 0.

8.2.2 Each DP was given a priority between 1-3, with 1 being the highest, as described in the Design Principles document (Ref 5). 2 DPs, DP1 'Safety' and DP2 'AMS Accordance', were Priority 1. Any design option evaluation that resulted in either DP1 or DP2 being "NOT MET" (red) or "PARTIALLY MET" (amber) would result in the rejection of that option. Any option that did not meet 4 or more DPs resulted in rejection of that option.

8.2.3 Each option was qualitatively assessed against each DP in order to evaluate whether the principle had been “MET”, “PARTIALLY MET” or “NOT MET”. A full summary of this assessment can be found in the Stage 2 Design Options and Evaluation document (Ref 6).

8.2.4 The “Do nothing” option was deemed unsuitable as it did not meet 5 DPs:

- DP2- Must accord with the CAA's published Airspace Modernisation strategy (CAP1711) and any current or future plans associated with it.
- 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.

8.2.5 Options 1-5 were rejected during Stage 2 of the ACP process, as the individual benefit of these options would not justify the change. However, when combined into one option, this “Preferred” option, Option 6, provides significant benefit.

8.2.6 Options 7-9 were considered but discounted as preliminary modelling demonstrated these options would not be utilised and would therefore offer limited benefit.

8.2.7 The “Preferred” option, Option 6, met 11 out of the 12 Design principles. The only DP not met was DP12. This DP was “PARTIALLY MET” due to the requirement of minimal training required following an airspace change; however, this training overhead was considered proportionate to the change.

9. Airspace Description Requirements

	The proposal should provide a full description of the proposed change including the following:	Description for this proposal
a	The type of route or structure; for example, airway, UAR, Conditional Route, Advisory Route, CTR, SIDs/STARs, holding patterns, etc	See section 6.2: paragraphs 6.2.1 and 6.2.2
b	The hours of operation of the airspace and any seasonal variations	H24
c	Interaction with domestic and international en-route structures, TMAs or CTAs with an explanation of how connectivity is to be achieved.	See paragraph 6.2.2 and Table 3
d	Airspace buffer requirements (if any). Where applicable describe how the CAA policy statement on 'Special Use Airspace – Safety Buffer Policy for Airspace Design Purposes' has been applied.	See section 4.3: paragraph 4.3.3
e	Supporting information on traffic data including statistics and forecasts for the various categories of aircraft movements (passenger, freight, test and training, aero club, other) and terminal passenger numbers	See section 4.2.5
f	Analysis of the impact of the traffic mix on complexity and workload of operations	See paragraph 6.2.3
g	Evidence of relevant draft Letters of Agreement, including any arising out of consultation and/or airspace management requirements	LOA NATS and Maastricht, agreed in principle (Ref 14)
h	Evidence that the airspace design is compliant with ICAO Standards and Recommended Practices (SARPs) and any other UK policy or filed differences, and UK policy on the Flexible Use of Airspace (or evidence of mitigation where it is not)	All new routes are CDRs and in compliance with FUA principles. New routes will be implemented in compliance with ICAO RNAV5 route spacing requirements
i	The proposed airspace classification with justification for that classification	No change to existing airspace classification
j	Demonstration of commitment to provide airspace users equitable access to the airspace as per the classification and where necessary indicate resources to be applied or a commitment to provide them in line with forecast traffic growth. 'Management by exclusion' would not be acceptable	NATS commits to provide the same level of access post-implementation in line with forecast growth
k	Details of and justification for any delegation of ATS	No change to the delegation of ATS

10. Safety Assessment

10.1 NATS has a dedicated safety manager for this project. Their role is to assess the scale of the airspace change, to ensure the CAA-compliant NATS Safety Management System is followed. Also, their role is to submit safety arguments with supporting evidence to the CAA's en-route safety regulator, to clearly demonstrate each airspace change is acceptably safe for implementation and the right assurances are in place.

10.2 The NATS safety manager has assessed that nothing is presently foreseen with this proposed option that would negatively impact on the level of safety achieved within the current operation.

11. Operational Impact

	An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:	Evidence of compliance/ proposed mitigation
a	Impact on IFR general air traffic and operational air traffic or on VFR General Aviation (GA) traffic flow in or through the area	See sections 7.4, 7.5, and 7.6
b	Impact on VFR operations (including VFR routes where applicable);	No impact on VFR operations
c	Consequential effects on procedures and capacity, i.e., on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds	N/A – this change is to enroute airspace above FL245
d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace	N/A – this change is to enroute airspace above FL245
e	Any flight planning restrictions and/or route requirements	Implementation testing will be carried out with the European Network Manager in accordance with their requirements as part of the delivery process

12. Supporting Infrastructure/ Resources

	General requirements	Evidence of compliance/ proposed mitigation
a	Evidence to support RNAV and conventional navigation as appropriate with details of planned availability and contingency procedures	Traffic uses the same regions as today in a similar manner from a navigation infrastructure point of view. Demonstrably adequate for the region.
b	Evidence to support primary and secondary surveillance radar (SSR) with details of planned availability and contingency procedures	Traffic uses the same regions as today in a similar manner from a surveillance point of view. Demonstrably adequate for the region.
c	Evidence of communications infrastructure including R/T coverage, with availability and contingency procedures	Traffic uses the same regions as today in a similar manner from a communications infrastructure point of view. Demonstrably adequate for the region.
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered	Existing contingency procedures continue to apply.
e	Effective responses to the failure modes that will enable the functions associated with airspace to be carried out including details of navigation aid coverage, unit personnel levels, separation standards and the design of the airspace in respect of existing international standards or guidance material	Existing contingency procedures continue to apply.
f	A clear statement on SSR code assignment requirements	No change to SSR code allocation
g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change	See section 6.2.5

13. Airspace and Infrastructure

	General requirements	Evidence of compliance/ proposed mitigation
a	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments	All changes are contained above FL245 and therefore are within Class C airspace
b	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer. This safety buffer shall be in accordance with agreed parameters as set down in CAA policy statement 'Safety Buffer Policy for Airspace Design Purposes Segregated Airspace'. Describe how the safety buffer is applied, show how the safety buffer is portrayed to the relevant parties, and provide the required agreements between the relevant ANSPs/ airspace users detailing procedures on how the airspace will be used. This may be in the form of Letters of Agreement with the appropriate level of diagrammatic explanatory detail.	There are no proposed changes to airspace structures or delegation of ATS.
c	The Air Traffic Management system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures.	See section 4.3
d	Air traffic control procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures	All routings are being introduced above FL245 – therefore this is not applicable
e	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable	No change to airspace classification is proposed.
f	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation	No change to airspace classification or volume is proposed.
g	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified	Existing contingency procedures would continue to apply.
h	The notification of the implementation of new airspace structures or withdrawal of redundant airspace structures shall be adequate to allow interested parties sufficient time to comply with user requirements. This is normally done through the AIRAC cycle	This will be promulgated via the AIRAC cycle
i	There must be sufficient R/T coverage to support the Air Traffic Management system within the totality of proposed controlled airspace	No change from today's Controlled Airspace. R/T coverage demonstrably adequate as per current day.
j	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered	See LoAs (Ref 14). Procedures and operating agreements will be implemented as per MATS Part II.
k	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc.) in the vicinity of the new airspace structure and no	See section 4.3

	suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests	

	ATS route requirements	Evidence of compliance/ proposed mitigation
a	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/ Eurocontrol standards	Traffic uses the same regions as today in a similar manner from a navigation infrastructure point of view. Demonstrably adequate for the region.
b	Where ATS routes adjoin terminal airspace there shall be suitable link routes as necessary for the ATM task	As today, there are no new link routes required for this ACP
c	All new routes should be designed to accommodate P-RNAV navigational requirements	N/A - New routes will be designed to RNAV5 standard

	Terminal airspace requirements	Evidence of compliance/ proposed mitigation
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas	There are no proposed changes to terminal airspace structures
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published instrument approach procedures (IAPs)	
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure	
d	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace	
e	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by the change sponsor upon implementation of the change in question (if these do not already exist)	
f	The change sponsor shall ensure that sufficient visual reference points are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic	
g	There shall be suitable availability of radar control facilities	
h	The change sponsor shall, upon implementation of any airspace change, devise the means of gathering (if these do not already exist) and of maintaining statistics on the number of aircraft transiting the airspace in question. Similarly, the change sponsor shall maintain records on the numbers of aircraft refused permission to transit the airspace in question, and the reasons why. The change sponsor should note that such records would enable ATS managers to plan staffing requirements necessary to effectively manage the airspace under their control	
i	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure	

	Off-route airspace requirements	Evidence of compliance/ proposed mitigation
a	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered	N/A – all airspace change is above FL245
b	Should there be any other aviation activity (military low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests	

14. Environmental Assessment

	Theme	Content	Evidence of compliance/ proposed mitigation
a	WebTAG analysis	Output and conclusions of the analysis (if not already provided elsewhere in the proposal)	N/A – In line with CAP1616 requirements (Ref 12) for a Level 2B Change with no disbenefit, a qualitative assessment of CO_2e has been provided; see section 7.7
b	Assessment of noise impacts (Level 1/M1 proposals only)	Consideration of noise impacts, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no noise impacts, the rationale must be explained	N/A – This is a Level 2B Change
c	Assessment of CO_2 emissions	Consideration of the impacts on CO_2 emissions, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no impact on CO_2 emissions impacts, the rationale must be explained	N/A – In line with CAP1616 requirements (Ref 12) for a Level 2B Change with no disbenefit, a qualitative assessment of CO_2e has been provided; see section 7.7
d	Assessment of local air quality (Level 1/M1 proposals only)	Consideration of the impacts on local air quality, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no impact on local air quality, the rationale must be explained	N/A – This is a Level 2B Change
e	Assessment of impacts upon tranquillity (Level 1/M1 proposals only)	Consideration of any impact upon tranquillity, notably on Areas of Outstanding Natural Beauty or National Parks, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no tranquillity impacts, the rationale must be explained	N/A – This is a Level 2B Change
f	Operational diagrams	Any operational diagrams that have been used in the consultation to illustrate and aid understanding of environmental impacts must be provided	See Figure 1, Figure 2, Figure 3, Figure 4 and Figure 5
g	Traffic forecasts	10-year traffic forecasts, from the anticipated date of implementation, must be provided (if not already provided elsewhere in the proposal)	See Table 1
h	Summary of environmental impacts and conclusions	A summary of all of the environmental impacts detailed above plus the change sponsor's conclusions on those impacts	See section 7.2, 7.7 and 7.8

15. Appendices

15.1 Supplementary Documents

Those marked as NO PUBLISH will not be available publicly due to:

- Containing personal information;
- Legitimate commercial interests that would be harmed if published; or
- Information on critical national infrastructure that cannot be placed in the public domain.

They will be supplied to the CAA for their eyes only.

Sup No.	Supplementary Document Title	Remarks
1.	Validation Simulation Executive Summary and Safety Assessment Executive Summary	(NO PUBLISH)
2.	Post-Consultation Validation Simulation Activity SP406 HAZID Summary	(NO PUBLISH)
3.	Draft LoA	(NO PUBLISH)
4.	AIP Changes	NATS Public
5.	Technical Definition Document WGS84	(NO PUBLISH)

15.2 List of Consultation Stakeholders

The consultation was considered most relevant to the targeted stakeholders listed below but was not exclusive to this list.

Stakeholders:			Consultation response received (yes/no)
NATMAC	Commercial Air Transport (CAT) representatives	Airlines UK	No
		British Airline Pilots Association (BALPA)	No
		British Airways (BA)	No
		Low Fare Airlines	No
		Heavy Airlines	No
	General Aviation (GA) representatives	British Business and General Aviation Association (BBGA)	No
		General Aviation Alliance (GAA)	No
		Aircraft Owners and Pilot Association (AOPA)	Yes
		Association of Remotely Piloted Aircraft Systems (ARPAS)	No
	Other relevant NATMAC representatives	Airspace 4 All (A4A)	No
		MoD Via Defence Airspace and Air Traffic Management (DAATM)	Yes
		Guild of Air Traffic Controllers (GATCO)	No
		Aviation Environment Federation (AEF)	No
ANSP		NATS[13]	N/a
		Eurocontrol Maastricht Upper Area Control Centre (MUAC)	Yes
		DFS Deutsche Flugsicherung GmbH (DFS)[14]	Yes
Airlines		KLM	No
		Ryan Air	No
		Lufthansa	No
		Delta Airways	No
		Scandinavian Airlines	No
		British Airways	No
		Norwegian Air International	No
		easyJet	Yes
		United Airlines	Yes
		Norwegian Air Shuttle	No

[13] As the UK ANSP NATS are listed as a Stakeholder. However, NATS are the sponsor of this change and are not included in external engagement.

[14] Non-targeted stakeholder

15.3 List of Design Principles

The following 12 design principles, shown in Table 5, were used to assess the design options.

No.	Design Principle	Priority	Category	Notes
1	Maintain or enhance current levels of safety.	1	Safety	
2	Must accord with the CAA's published Airspace Modernisation strategy (CAP1711) and any current or future plans associated with it.	1	Policy	*The CAA have stated that this DP is required by all change sponsors. CAP1711 describes what airspace modernisation must deliver*
3	The proposed airspace design will maintain or enhance operational resilience of the ATC network	2	Resilience	
4	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.	2	Operational (Airspace Optimisation)	
5	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.	2	Operational (Airspace Optimisation)	
6	The proposed amendments to the route network will provide a compatible interface with Maastricht Upper Area Control.	2	Operational (MUAC Connectivity)	
7	The proposed route amendments will facilitate the reduction of CO_2 emissions per flight.	2	Environmental (CO_2 Emissions)	
8	Minimise environmental impacts to stakeholders on the ground.	2	Environmental (Impact to Stakeholders on the Ground)	
9	The proposed route amendments will have minimal MoD operational impact, commensurate with FUA principles.	2	Technical (MoD Requirements)	

10	The proposed changes will be contained within the extant airspace i.e., above FL195 (no additional airspace required).	2	Technical (Minimise CAS)	
11	The proposed airspace design will provide a basis for future Free Route Airspace deployments within the London UIR.	2	Technical (Modernisation)	
12	The design minimises operational impact to airspace users (ATC/ Airlines – Minimal Training).	2	Operational (Training)	

Table 5: List of Design Principles

15.4 Glossary

A4A	Airspace for All
ACP	Airspace Change Proposal
AEF	Aviation Environment Federation
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation And Control
ANSP	Air Navigation Service Provider
AOPA	Aircraft Owners and Pilot Association
ARPAS	Association of Remotely Piloted Aircraft Systems
ATC	Air Traffic Control
ATCO	Air Traffic Control Operator
ATS	Air Traffic Service
BA	British Airways
BALPA	British Airline Pilots Association
BBGA	British Business and General Aviation Association
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
CAT	Commercial Air Traffic
CDA	Continuous Descent Approach
CDR	Conditional Route
COP	Co-ordination Point
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
CTA	Control Area
CTR	Control Zone
DAATM	Defence Airspace and Air Traffic Management
DFS	Deutsche Flugsicherung GmbH
DME	Distance Measuring Equipment
DP	Design Principle
EU NM	European Union Network Manager
FIR	Flight Information Region
FL	Flight Level
FRA	Free Route Airspace
FUA	Flexible Use Airspace
GA	General Aviation
GAA	General Aviation Alliance
GATCO	Guild of Air Traffic Controllers
H24	24-hours a day operation
IAP	Instrument Approach Procedures
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
KLM	Koninklijke Luchtvaart Maatschappij N.V
LoA	Letter of Agreement
MoD	Ministry of Defence
MUAC	Maastricht Upper Area Control
NAT	North Atlantic
NATMAC	National Air Traffic Management Advisory Committee

NATS	National Air Traffic Service
NDB	Non-Directional Beacon
NM	Nautical Mile
NTFSR	Night-Time Fuel Saving Route
MUAC	Eurocontrol Maastricht Upper Area Control Centre
OCT	Operational Conversion Training
P-RNAV	Precision Area Navigation
RNAV	Area Navigation
RNP	Required Navigation Performance
R/T	Radio Telephony
SARG	Safety and Airspace Regulation Group
SARPs	ICAO Standards and Recommended Practices
SID	Standard Instrument Departure
SME	Subject Matter Expert
SRD	Standard Route Document
SSR	Secondary Surveillance Radar
STAR	Standard Arrival Route
SUA	Special Use Airspace
UAR	Upper Air Route
UIR	Upper Information Region
UK	United Kingdom
VOR	VHF Omni-Directional Range
VFR	Visual Flight Rules
WebTAG	Department of Transport analysis tool

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