RAF FAIRFORD
AIRSPACE CHANGE PROPOSAL (ACP) 2021-078

OVERALL BRIEFING CLASSIFICATION:
UNCLASSIFIED

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Overview

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- Introduction-What we are discussing
- HALE RPA description/explanation
- Concept of Operations
- Design Principles
- Actions Since Stage 2
- HALE Option 3 and Expected Impacts
- Feedback

WHAT ARE WE DISCUSSING?

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- **Remotely Piloted Aircraft (RPA) operations at RAF Fairford**
- **Statement of Need**
  - **In order to support NATO's Agile Combat Employment concept, the US Air Force is making significant infrastructure investments on airbases in the UK and other allied nations. There is an emerging requirement for military aircraft, including Remotely Piloted Aircraft (RPA), to operate regularly from RAF Fairford. In accordance with CAP 722 – Unmanned Aircraft System Operations in UK Airspace – Guidance and Policy, beyond visual line of sight (BVLOS) operations require either a CAA-approved Detect and Avoid (DAA) capability or to remain within a block of airspace that is segregated from other airspace users. This ACP aims to establish suitable segregated airspace to enable RPA transition between RAF Fairford and high-altitude transit.**

HALE RPA DESCRIPTION & OPERATIONAL INFO

- **HALE RPA generally operate above FL400**
- **The RQ-4 Global Hawk is a USAF HALE RPA**
  - **Wingspan of 130.9 feet and 47.6 feet long**
  - **Powered by a single turbofan engine**
  - **Take-off and landing of the GH is fully automated**
  - **Has flexible levels of autonomy**
  - **Can be flown on a pre-programmed route**
  - **Can be taken off route by pilot to follow ATC instruction**
  - **GH is equipped with ADS-B**

Concepts of Operations

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- Airspace to be used for Climb/Descent to/from FL500+ only
  - Not operating or training airspace
- Frequency and Duration of Activations
  - 2-3 times per week up to 3 hours per activation
  - 3-hour duration ensure airspace is available in the event of weather/maintenance delays, or if emergency requires early return to RAF Fairford while still in the local area
- Time of Activation
  - Normally from 20:00-05:30 UTC to minimise impacts
  - Potential for activation as early as 1 hr after sunset and as late as 1 hr prior to sunrise with advanced coordination but expected to be rare
  - No activations during the day to ensure as little impact as possible while maintaining operational capability

ACP-2021-078 DESIGN PRINCIPLES

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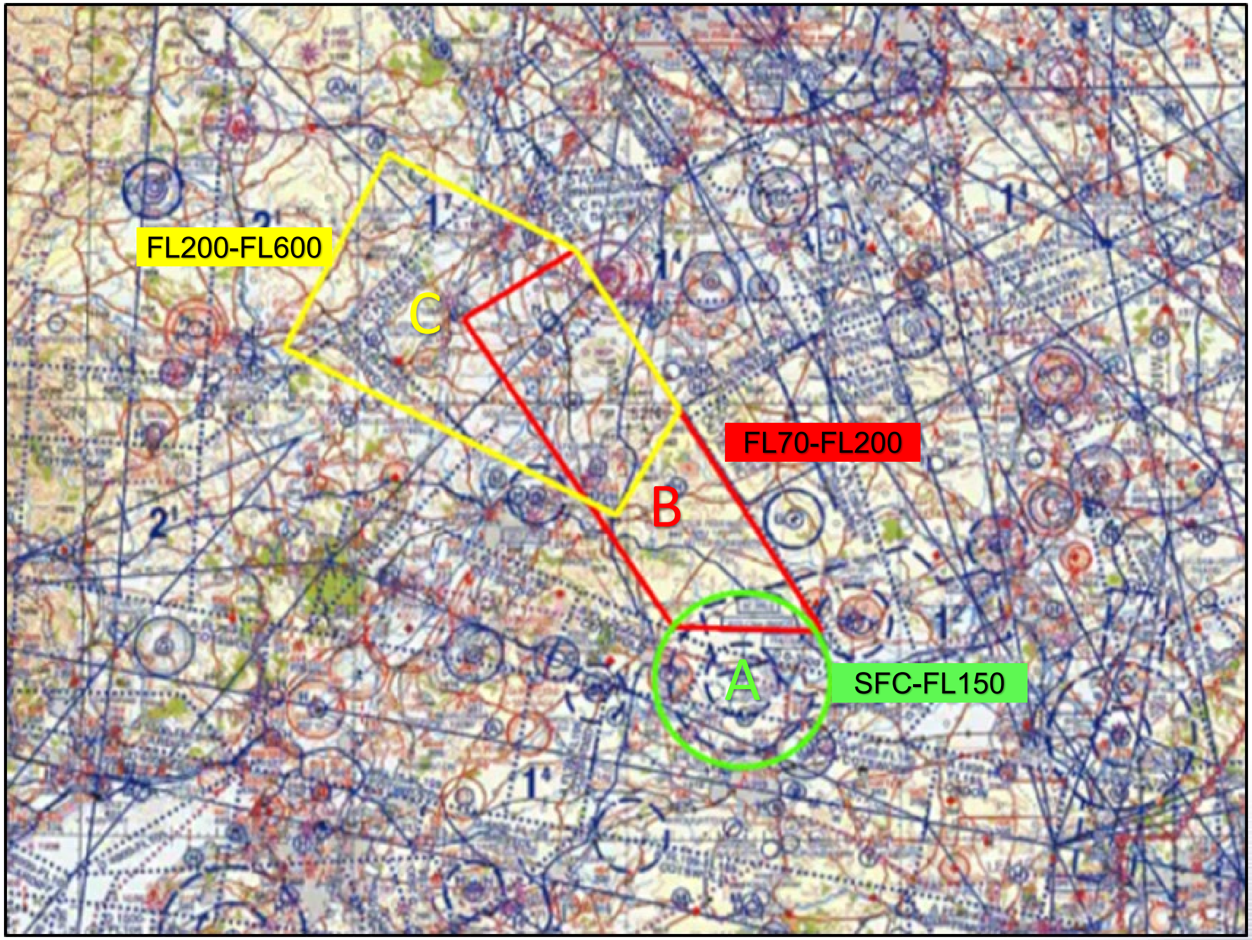
- **Principles used to guide development of airspace design options**

Design Principle		Priority
a	Provide a safe environment for airspace users	1
b	Provide access to sufficient suitable airspace to enable efficient RPAS transition between the ground and medium/high-level transit routes	2
c	Minimise the impact to other airspace users	3
d	Adhere to FUA principles and strategy	3
e	Where possible and practicable, accommodate the Airspace Modernisation Strategy	4
f	Endeavour to make the airspace as accessible as possible	5
g	Minimise the environmental impact of non-participating aircraft	6

Actions Since Stage 2

HALE Option 1 Discounted



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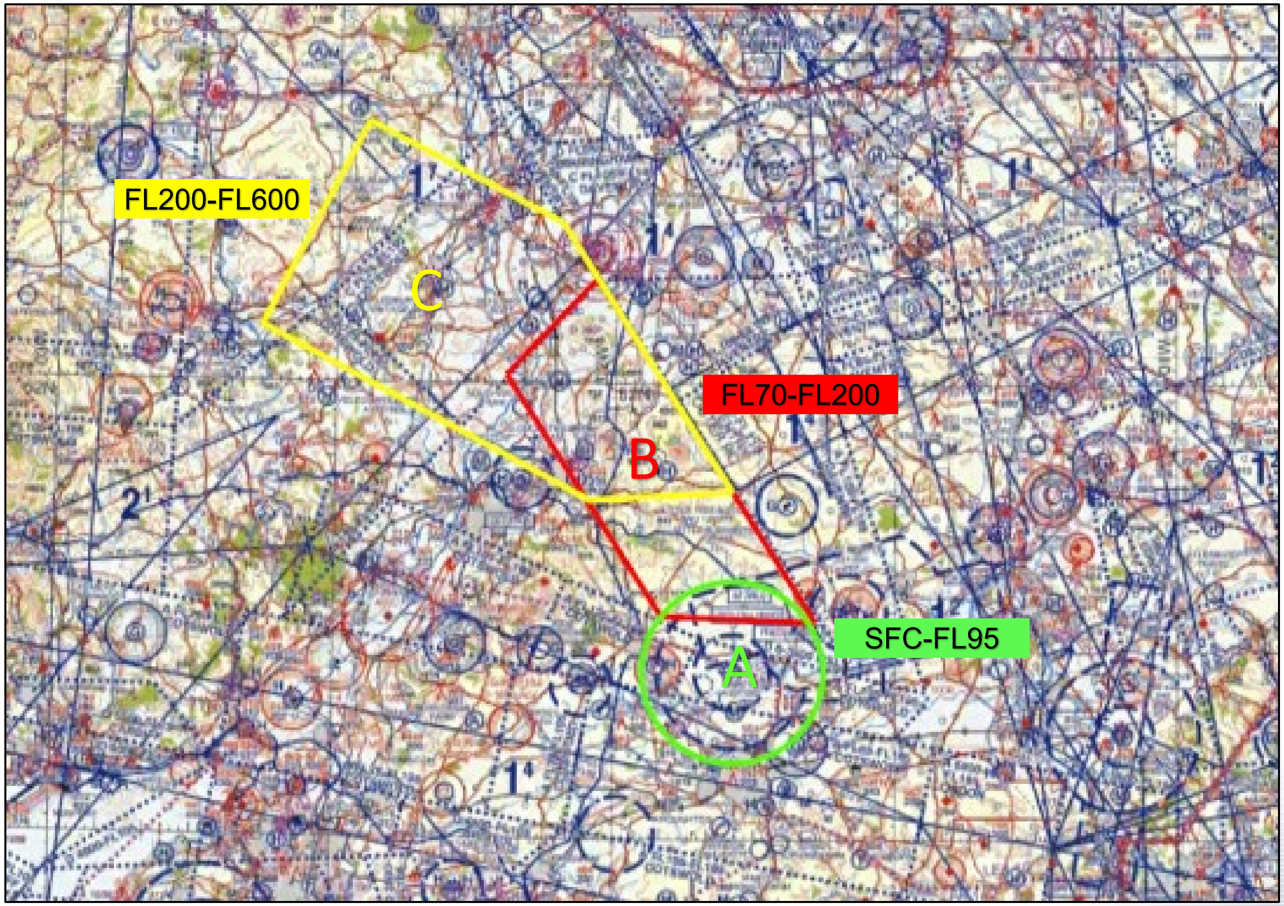
HALE Option 2 Discounted



Actions Since Stage 2

Why were they discounted?

- **Safety**
  - It was determined a larger volume of airspace was needed to minimise the chance of excursion in all foreseeable contingency/emergency scenarios
- **Impacts to other users of the airspace**
  - The upper limit of Segment A would cause extensive impacts to flight planning for departures at adjacent airports. Additionally, the southern portion of Segment A for both options was identified as a major impact to civil traffic patterns.
- **Compliance with Safety Buffer Policy**
  - Safety Buffer Policy required a buffer of 5 NM from the edge of a TMA, CTR, or CTA (excluding the Upper CTA) and 10 NM from ATS Routes above FL195 may (may be reduced by 2 NM with appropriate mitigation
  - Sponsor is requesting dispensation to a 3 NM buffer (2 NM internal/1 NM external)

HALE Option 3

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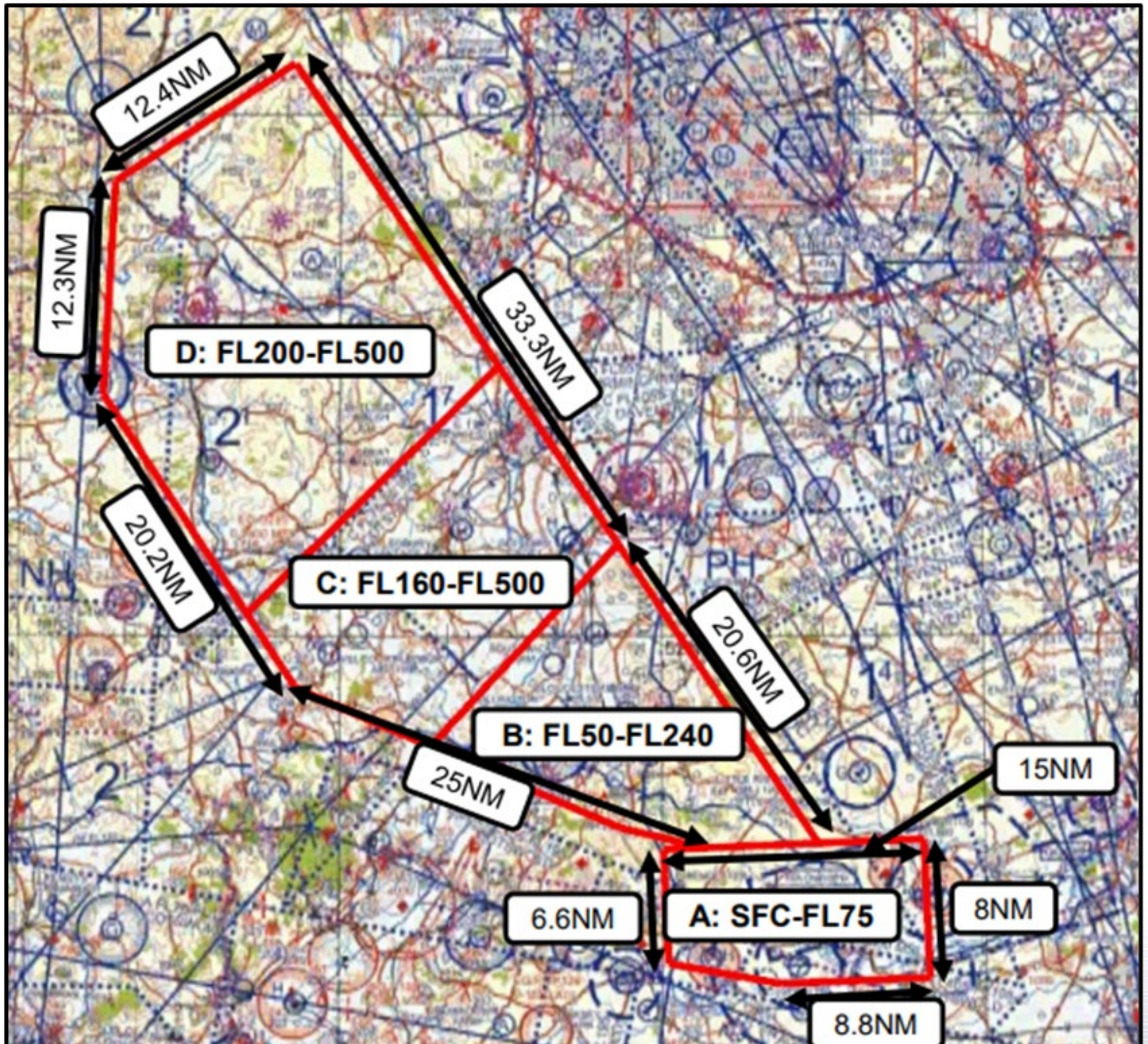
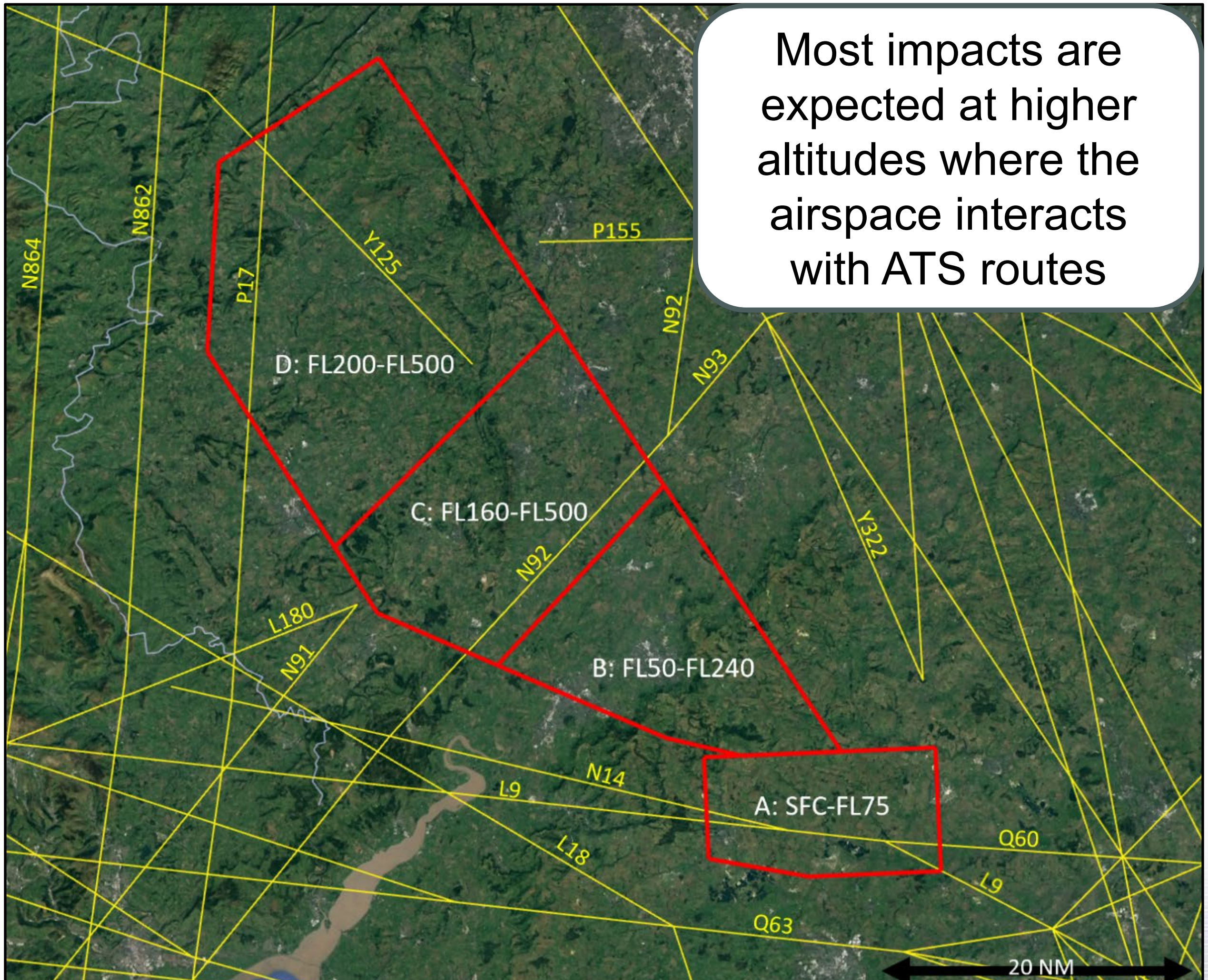
How was HALE Option 3 Developed?

- **Internal USAF Analysis/NATS Feedback led to Interim Option**
  - Larger climb area further reduced the chance of excursion
  - Allowed for an internal buffer on 2 NM to be maintained throughout climb/descent during any foreseeable emergency scenario
  - Allowed for more efficient climb (less time in the airspace)
- **Engagement with NATS on Interim Option**
  - NATS provided feedback on more modifications to further reduce impact
  - The Sponsor considered NATS feedback and complied where possible.
    - Shifting climb airspace (Segments C & D) to location of lesser impact
    - Modification of Segment A (lateral and vertical) to reduce impacts
- **HALE Option 3 was the result of USAF and NATS engagement and is the sole design option being evaluated against the "do nothing" option.**

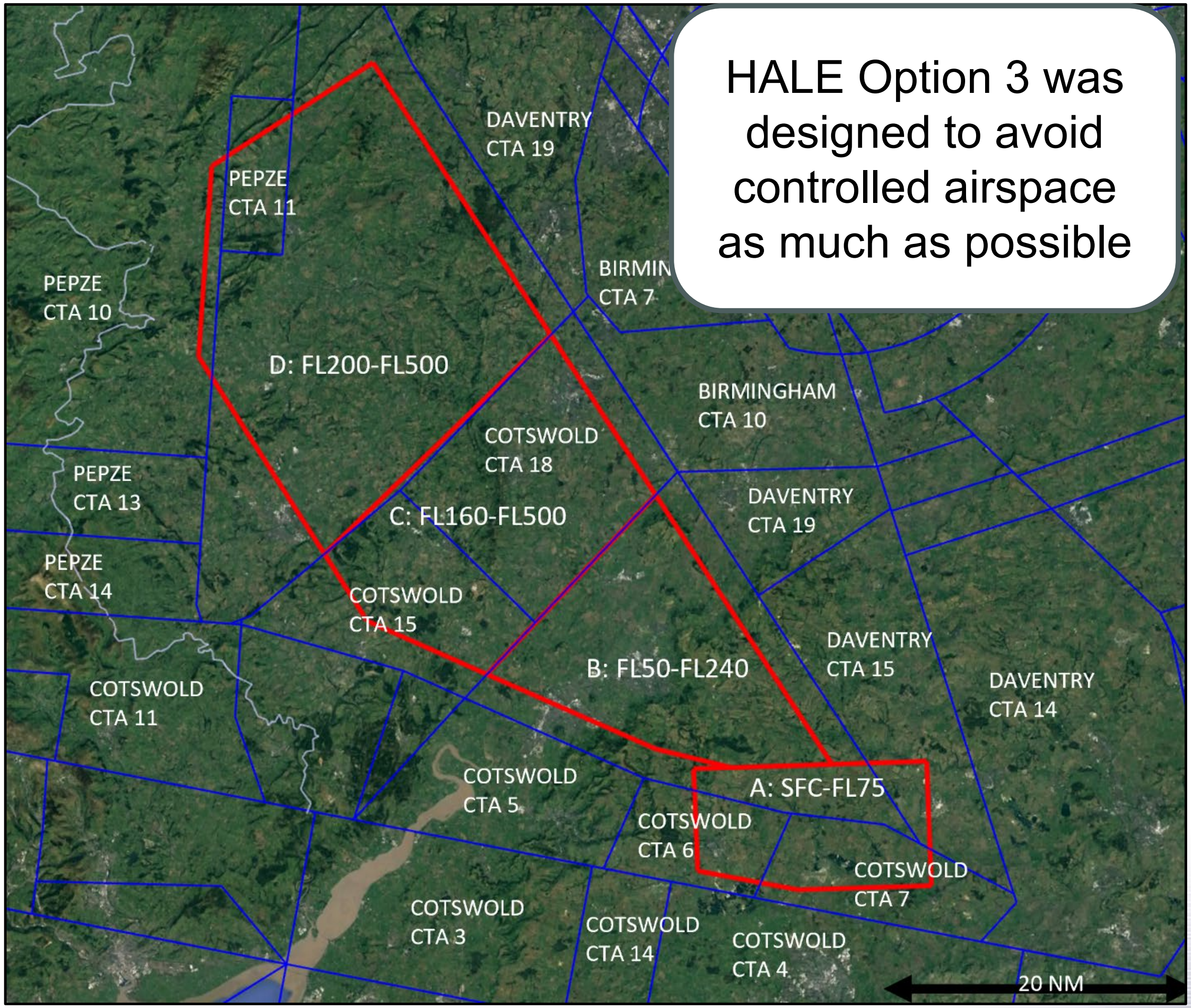
HALE Option 3



Impacts of HALE Option 3 Aviation Stakeholders



Impacts of HALE Option 3 Aviation Stakeholders



Impacts of HALE Option 3
Aviation Stakeholders

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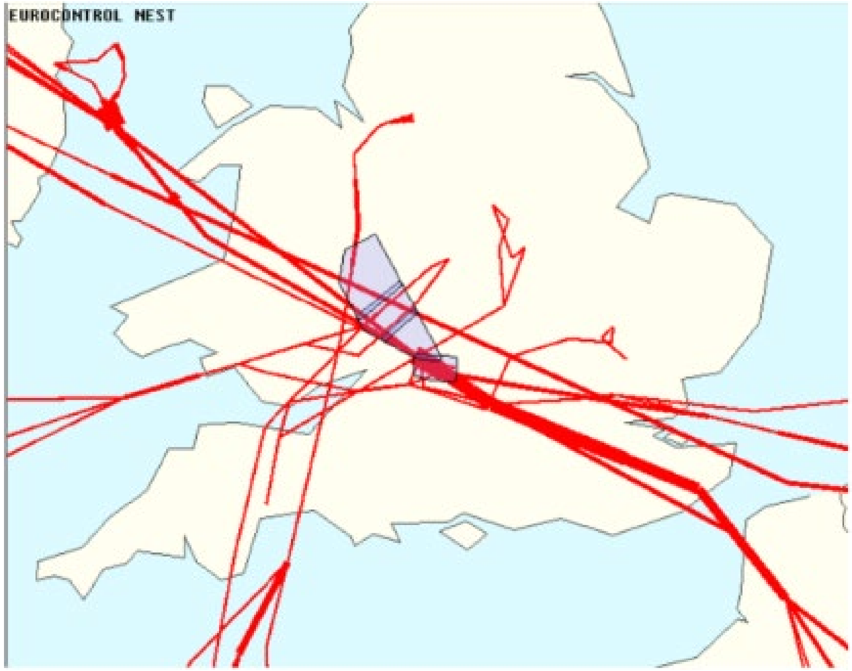
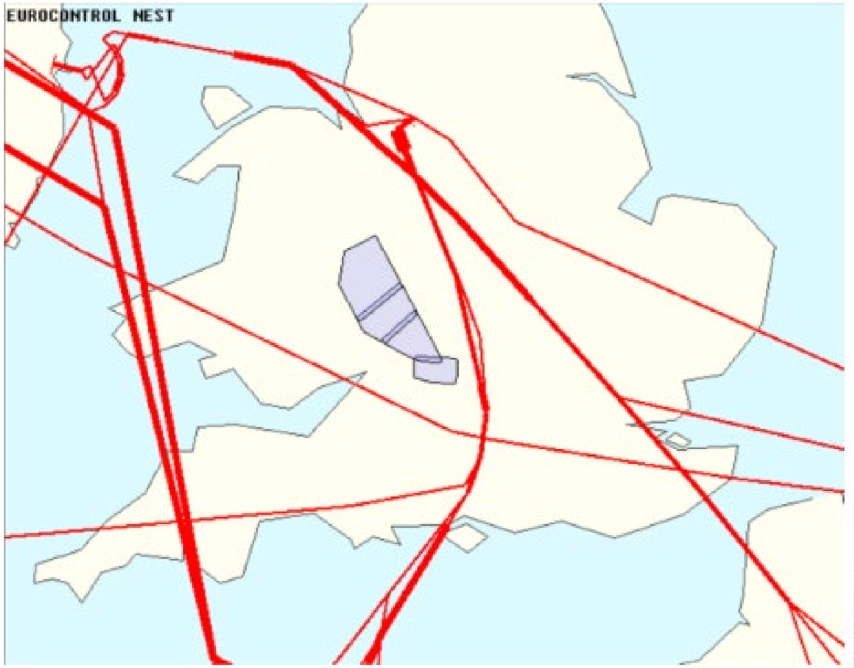
Simulated Impact



Baseline Commercial Traffic Trajectories



Re-routed Trajectories when Danger Areas are active

Impacts of HALE Option 3 Aviation Stakeholders

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Winter Environmental Impact – Average per flight

The average route length, fuel burn and carbon dioxide equivalent (CO_2e) emissions per impacted flight per hour during the winter hours (between 17:00 and 07:00 UTC) are given in the table below. The average flight has increased track distance of 41NM, increased fuel burn by 335kg and related emissions by 1,065kg when the ACP-2021-078 Danger Area is activated. The greatest number of flights would be impacted if activation occurred in the 3-hour period between 17:00-20:00. The greatest overall impact on fuel/CO_2e would occur if activation occurred between 22:00-01:00 or 02:00-05:00, affecting fewer but much heavier aircraft.

Winter schedules		Average Track Distance (NM)			Average Fuel Burn (Kg)			Average CO_2e Emissions (Kg)		
Hour	Flights	Baseline	Scenario	Difference	Baseline	Scenario	Difference	Baseline	Scenario	Difference
17:00-18:00	12	1,506	1,541	34	11,959	12,128	169	38,030	38,567	537
18:00-19:00	16	2,401	2,451	51	24,170	24,557	387	76,861	78,091	1,231
19:00-20:00	4	2,330	2,362	32	33,958	34,122	164	107,986	108,508	522
20:00-21:00	3	1,048	1,066	18	5,454	5,549	95	17,344	17,646	302
21:00-22:00	5	2,062	2,117	55	31,649	32,205	556	100,644	102,412	1,768
22:00-23:00	6	2,041	2,085	44	21,745	22,067	322	69,149	70,173	1,024
23:00-00:00	2	1,675	1,793	118	8,798	9,415	617	27,978	29,940	1,962
00:00-01:00	1	5,048	5,108	61	56,738	57,420	682	180,427	182,596	2,169
01:00-02:00	0	0	0	0	0	0	0	0	0	0
02:00-03:00	1	3,480	3,537	58	35,953	36,548	595	114,331	116,223	1,892
03:00-04:00	8	2,311	2,347	36	34,355	34,727	372	109,249	110,432	1,183
04:00-05:00	5	3,130	3,175	45	42,291	42,845	554	134,485	136,247	1,762
05:00-06:00	7	3,868	3,899	31	66,386	66,905	519	211,107	212,758	1,650
06:00-07:00	11	1,184	1,208	24	6,220	6,342	122	19,780	20,168	388
Average	**6**	**2,193**	**2,234**	**41**	**25,936**	**26,271**	**335**	**82,476**	**83,542**	**1,065**

•CO_2e is a standard measurement that considers the impact of all greenhouse gas emissions due to fuel burn as if they were all carbon dioxide. For aviation fuel, the conversion rate is 1kg fuel to 3.18kg of CO_2e.

•Numbers are presented rounded to nearest whole kg or NM. The data behind the scenes uses unrounded numbers. Positive numbers indicate additional contributions (penalty), negative numbers indicate lower contributions (benefit).

Impacts of HALE Option 3 Aviation Stakeholders

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Summer Environmental Impact – Average per flight

The average route length, fuel burn and carbon dioxide equivalent (CO_2e) emissions per impacted flight per hour during the summer hours (between 21:00 and 05:00 UTC) are given in the table below. The average flight has increased track distance of 31 NM, increased fuel burn by 277 kg and related emissions by 881 kg when the ACP-2021-078 Danger Area is activated. The greatest number of flights would be impacted if activation occurred in the 3-hour period between 02:00-05:00. The greatest overall impact on fuel/CO_2e would occur if activation occurred between 00:00-03:00 or 01:00-04:00, affecting fewer but much heavier aircraft.

Summer schedules		Average Track Distance (NM)			Average Fuel Burn (Kg)			Average CO_2e Emissions (Kg)		
Hour	Flights	Baseline	Scenario	Difference	Baseline	Scenario	Difference	Baseline	Scenario	Difference
21:00-22:00	6	997	1,038	42	7,424	7,715	291	23,608	24,534	925
22:00-23:00	3	2,001	2,041	40	32,264	32,476	212	102,600	103,274	674
23:00-00:00	2	1,026	1,068	42	5,490	5,710	220	17,458	18,158	700
00:00-01:00	1	4,068	4,085	16	76,217	76,523	306	242,370	243,343	973
01:00-02:00	4	3,542	3,618	77	37,509	38,167	658	119,279	121,371	2,092
02:00-03:00	8	4,002	4,037	35	49,888	50,313	425	158,644	159,995	1,352
03:00-04:00	11	3,348	3,368	20	39,775	39,984	209	126,485	127,149	665
04:00-05:00	7	3,580	3,583	3	53,298	53,324	26	169,488	169,570	83
Average	**5**	**3,004**	**3,035**	**31**	**37,816**	**38,093**	**277**	**120,255**	**121,136**	**881**

•CO_2e is a standard measurement that considers the impact of all greenhouse gas emissions due to fuel burn as if they were all carbon dioxide. For aviation fuel, the conversion rate is 1kg fuel to 3.18kg of CO_2e.

•Numbers are presented rounded to nearest whole kg or NM. The data behind the scenes uses unrounded numbers. Positive numbers indicate additional contributions (penalty), negative numbers indicate lower contributions (benefit).

Impacts of HALE Option 3 Aviation Stakeholders

- **Simulation of additional fuel costs due to required re-routes**
  - **Average of ~ 178 GBP per flight impacted**
  - **Worst-case (3 activation/week) simulated annual impact shown below**

Year	Delta from baseline (fuel in tonnes)	Increased Fuel Cost
2024	743	£ 438,704
2025	757	£ 446,971
2026	767	£ 452,875
2027	776	£ 458,189
2028	785	£ 463,503
2029	790	£ 466,456
2030	796	£ 469,998
2031	802	£ 473,541
2032	807	£ 476,493
2033	819	£ 483,579

Notes: 1. Simulation data from NATS Analytics dated September 2024
2. (Additional annual fuel burn x £590.45-price per tonne on 17 Jul 23)/ # of impacted flights annually

Impacts of HALE Option 3 Aviation Stakeholders

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Impacts to lower-level flight operations

- HALE RPA can hold departure or delay arrival for emergency aircraft, HEMS transits, or other high priority mil & civ flights
- DACS will be available, when possible, for other transitions of the airspace
- Periods of activation and duration of activation were specifically chosen to have as little impact of GA traffic as possible

Impacts of HALE Option 3 Environmental

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CO2 Emissions

- Simulated best and worst-case annual impact
- ~ 0.95 tonnes on average per flight impacted

Minimum Expected CO_2 Impact	
Year	CO2 Emissions Impact (Tonnes)
2024	1,577
2025	1,606
2026	1,629
2027	1,648
2028	1,666
2029	1,676
2030	1,688
2031	1,701
2032	1,711
2033	1,724

Maximum Expected CO_2 Impact	
Year	CO2 Emissions Impact (Tonnes)
2024	2363
2025	2,408
2026	2,439
2027	2,467
2028	2,496
2029	2,512
2030	2,531
2031	2,551
2032	2,567
2033	2,586

Impacts of HALE Option 3 Environmental

Noise, Local Air Quality, Tranquility, and Biodiversity

- Since no impacts are expected to civil traffic patterns below 7,000 feet, no adverse impacts related to noise, local air quality, tranquility, or biodiversity are expected.
- While impacts to civil traffic patterns below 7,000 feet are highly unlikely, the Sponsor has planned impact mitigation efforts to include NOTAMs when proposed airspace would be active, activation during periods of low traffic density, and the utilisation of a DACS.

Impacts of HALE Option 3 Communities

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Since no impacts are expected to civil traffic patterns below 7,000 feet, no adverse impacts communities are expected.

Impacts of HALE Option 3 Airports/ANSPs

- **Infrastructure Costs**
  - **NATS feedback has indicated that no infrastructure costs are expected with this design.**
- **Operational Costs**
  - **NATS feedback has indicated that operational costs will likely be nil or negligible with this design.**
- **Deployment Costs**
  - **Costs would be incurred by NATS, RAF Brize Norton, and 78 Sqn through the briefing and training of air traffic controllers for RPA operations to include emergency and contingency situations. There will also be costs for ATM system updates.**
  - **NATS is still conducting planning to determine the estimated deployment costs associated with this design. The Sponsor will share these costs as this information becomes available.**

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We Want Your Feedback!

The Sponsor endeavors to minimise the impact of its operations while still ensuring that required military activity can safely and efficiently be conducted.

- **Are there any design amendments or potential mitigations that you think the Sponsor should consider to achieve this?**
- **Do you expect to be impacted by this airspace change? If so, please describe the expected impact(s).**
- **Are there other general considerations that you would like the Sponsor to consider in order to mitigate impacts?**