CAA CAP 1616 Options Appraisal Assessment (Phase III Final)

Title of Airspace Change Proposal:	Swanwick Airspace Improvement Programme - Airspace Deployment 6 (SAIP AD6)		
Change Sponsors:	NATS En Route Ltd (NERL)/London Luton Airport Operations Ltd (LLA) (EGGW) – The Sponsors		
Project Reference:	ACP 2018-65		
Case study commencement date:	[redacted]	**Case study report as at:**	[redacted]

Account Manager: N/A	**Airspace Regulator (Engagement & Consultation):** [redacted]	**IFP:** [redacted]	**OGC:** [redacted]
Airspace Regulator (Technical): [redacted]	**Airspace Regulator (Environment):** [redacted]	**Airspace Regulator (Economist):** [redacted]	**ATM (Inspector ATS Ops):** [redacted]

Instructions

To aid the SARG project leader's efficient project management, please highlight the "status" cell for each question using one of the four colours to illustrate if it is:

Resolved - GREEN | Not Resolved – AMBER | Not Compliant – RED | Not Applicable - GREY

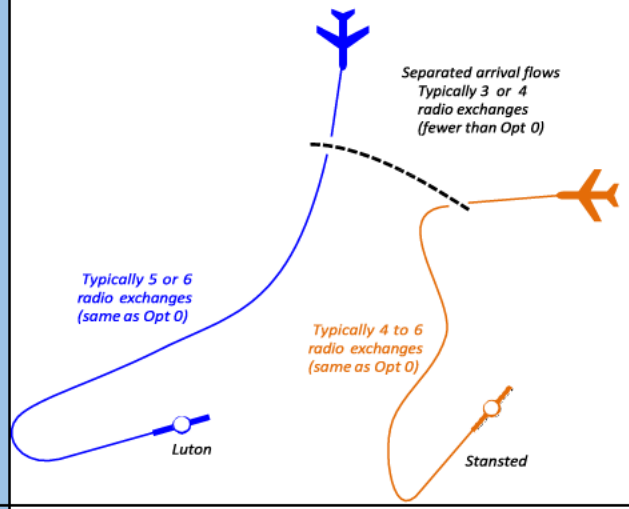
Guidance

The broad principle of economic impact analysis is **proportionality**; is the level of analysis involved proportionate to the likely impact from that ACP? There are three broad levels of economic analysis; qualitative discussion, quantified through metrics, and monetised in £ terms. The more significant the impact, the greater should be the effort by sponsors to quantify and monetise the impact.

1. Background – Identifying the Do Nothing (DN) /Do Minimum (DM) scenarios			Status
1.1	**Are the outcomes of DN/DM scenarios clearly outlined in the proposal?**		☒ ☐ ☐ ☐
1.1.1	Has the change sponsor produced an Options Appraisal (Phase III - Final) which consists of the Full appraisal with any refinements or changes made as a result of the Stage 3 formal consultation with stakeholders? [E24]	Yes, the change Sponsors have produced the Final Options Appraisal which summarises the feedback received from the consultation stage. The main changes to the design, based on the consultation are the following: • The holding pattern has been moved and the lowest normally useable altitude has been raised by 1,000ft. • Some higher-altitude routes have been shortened and kept higher for longer, to reduce the disbenefit in fuel consumption and CO2, and to reduce noise impacts. • The holding pattern adjustment and route adjustment has increased the likelihood of controllers building an efficient arrival sequence further away and higher up than in the consulted airspace design. • The proposed final option is Option 1A, which is a modified version of the Option 1 (as in Stage 3). The Sponsors provide a detailed quantitative and qualitative assessment of the Option 1A both in case of DCO (Development Consent Order) and without. For completeness, the Sponsors also provide the assessment of the baseline and of Option 1 as they were presented during the Consultation Stage.	☒ ☐ ☐ ☐

2. Direct impact on air traffic control	Status

2.1	**Are there direct cost impacts on air traffic control / management systems?** **If so, please provide below details of the factors considered and the level in which this has been analysed.**				☒ ☐ ☐ ☐
2.1.1	*Examples of costs considered (please add costs that have been discussed, and any reasonable costs that the Airspace Regulator (Technical) feels have NOT been addressed)*				
		Not applicable	Qualitative	Quantified	Monetised
2.1.2	Infrastructure changes		x	N/A	N/A
2.1.3	Deployment		x	x	x
2.1.4	Training		x	N/A	N/A
2.1.5	Day-to-day operational costs / workload / risks	x			
2.1.6	Other (provide details)	x			
2.1.7	**Comments:** The Sponsors state that the proposed airspace change is not going to have an impact on the airport or ANSP infrastructure beyond the initial deployment phase which would require some system engineering amendments and does not anticipate additional training costs for commercial airlines. The proposed change deployment is estimated to be £4.13m (for both Sponsors combined NATS and London Luton Airport) in both cases without or with the DCO. This change will require *i.* significant air traffic controller training (i.e., 120-150 controllers and c.50 assistants at NATS Swanwick); *ii.* extensive use of NATS simulator facility; and *iii.* 25 controllers and 5 assistants based at London Luton Airport (LLA). In addition, the Sponsors predict that support staff will be needed to run the simulator, i.e., planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. The Sponsors highlight that during training times, operational rostering might become a factor as there is still a need to provide continuous service delivery.				
2.2	**Are there direct beneficial impacts on air traffic control / management systems?** **If so, please provide details and how they have been addressed:**				☒ ☐ ☐ ☐
2.2.1	*Examples of benefits considered*	Not applicable	Qualitative	Quantified	Monetised
2.2.2	Reduced work-load		x	x	N/A
2.2.3	Reduced complexity / risk		x	x	N/A
2.2.4	Other (provide details)	x			

2.2.5	**Comments:** The Sponsors report an analysis of the capacity constraint at the airport and explains how the proposed change is going to improve the current situation by creating extra capacity at LLA. All arrivals to LLA are entwined with arrivals to Stansted for most of their time in UK airspace, until they reach the holds and only after leaving the holds, they are separated into their respective arrival flows. The extra capacity created by separating the LLA flow from the Stansted upstream flow removes the probability of upstream delay, such that in 2022 the estimated net delay avoidance (reduction) is of c.10,200 minutes, that will rise to c.11,200 minutes, both in with or without the DCO at LLA, in 2032.  The Sponsors state that the proposed change allowing for arrivals separation at LLA (see picture below), will lead to a more resilient airspace system by assuring a lower need for radio exchange per flight for air traffic controllers, that can "*spend more time managing the overall flows and less time making constant adjustment to individual flights.*" This picture shows how the separation can reduce air traffic controllers' workload, because the simplified upper system of arrivals would require 15-20 radio exchange, which is lower than the baseline (21-28 radio exchange).	
2.3	**Where monetised, what is the net monetised impact on air traffic control (in net present value) over the project period?** N/A	
2.4	**Are the direct impacts on air traffic management analysed accurately and proportionately?** Yes. The Sponsors provide both a qualitative and quantitative assessment of the costs and benefits that the proposed airspace change will have on the air traffic management. The methodology used is the same as reported in Stage 3 and in line with CAP1616 requirements.	☒ ☐ ☐ ☐

3. Changes in air traffic movements / projections		Status
3.1	**What is the impact of the ACP on the following and has it been addressed in the ACP proposal?**	☒ ☐ ☐ ☐

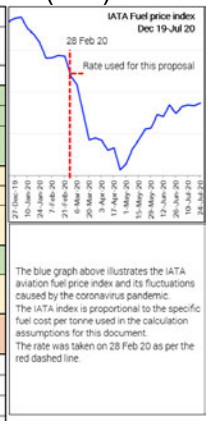
		Not applicable	Qualitative	Quantified	Monetised
3.1.1	Number of aircraft movements		x	x	N/A
3.1.2	Type of aircraft movement		x	N/A	N/A
3.1.3	Distance travelled		x	x	x
3.1.4	Area flown over / affected		x	N/A	N/A
3.1.5	Other impacts	x			
3.1.6	**Comments:** The aim of this proposed airspace change is to reduce airspace complexity by separating the LLA arrivals from Stansted arrival flows, hence the Sponsors do not envisage an increase in airport capacity but still provides a description of the aircraft movements both at LLA and Stansted airport in 2023, including forecast for 2032 movements (both with DCO and without DCO). The Sponsors evaluate the capacity, quantifies and monetises the cost of delays at the airport. Using a NATS study, they assume that the airline delay costs £3.68/min when the delay is of 15 mins and £53.50/min when the delay is more than 15 mins. It is estimated that in 2022, Option 1A would lead to a net delay avoidance of c 10,200 minutes, which if monetised is equal to £37,500pa. In 2032 the net delay avoidance will raise, and the estimated saving would be of c.11,200 minutes (with or without LLAL's DCO), that if monetised is equal to £41,200pa.				
3.2	**Has the forecasting of traffic done reasonably using best available guidance (e.g. DfT WebTAG, the Green Book, Academic sources…etc?)** Yes. The Sponsors use the WebTAG table to estimate the impact that the proposed Option 1A will have in terms of CO2 emissions, fuel burn and noise impact.				
3.3	**What is the impact of the above changes (3.1) on the following factors?** The Sponsors provide a summary of the noise impact both with and without the DCO and specifies that the proposed final option – Option 1A – *"would keep aircraft higher for longer, and if the hold needed to be used, it would be used 1,000ft higher than Option 1"* (option used during the consultation stage). The Sponsors state that *"the proposed new hold would be located over Grafham Water (close to the junction of the A1 and the A14 west of Huntingdon)"* and that following the feedback received during the availability of the lowest standard holding level has been modified and it will now result in a FL90 from previous FL80, which will be retained for contingency purposes only. This implies that the adjustment to the hold position allowed to keep aircrafts away from Huntingdon and St Neots, and to assure that aircraft would be slightly higher and for longer on several arrival routes. Lastly the Sponsors state that *"the adjusted position of the hold would improve dispersal between FL80-5,000ft when the hold is not in use"*.				

Description *positive value reflects a **net benefit** (i.e. a reduction in noise)	2032 No DCO Option 1A		2032 With DCO Option 1A	
	WebTAG assessment	Sensitivity test excluding impacts below 51 dB (for aviation proposals only)	WebTAG assessment	Sensitivity test excluding impacts below 51 dB (for aviation proposals only)
Net present value of change in noise (£, 2010 prices):	£471,306	-£30,221	£572,196	£402,581
Net present value of impact on sleep disturbance (£, 2010 prices):	£236,442	£98,896	-£105,328	£122,790
Net present value of impact on amenity (£, 2010 prices):	£282,335	-£81,645	£603,711	£205,978
Net present value of impact on AMI (£, 2010 prices):	£4,844	£4,844	£11,836	£11,836
Net present value of impact on stroke (£, 2010 prices):	-£20,793	-£20,793	£24,776	£24,776
Net present value of impact on dementia (£, 2010 prices):	-£31,521	-£31,521	£37,202	£37,202
Households experiencing increased daytime noise in forecast year:	2252		2798	
Households experiencing reduced daytime noise in forecast year:	2959		3858	
Households experiencing increased night time noise in forecast year:	872		979	
Households experiencing reduced night time noise in forecast year:	1156		934	

The Sponsors estimate that the fuel cost disbenefit in the opening year will be around £689,000 while in 2032 it will be respectively equal to -£467,00 without the DCO, while in the DCO scenario the fuels cost disbenefit will be of £474,000. In the table below it is also reported a more disaggregated analysis of the fuel cost per flight at London Luton Airport (LLA).

	Fuel per year, tonnes, negative is disbenefit		
Scenario	2022	2032 No DCO	2032 With DCO
Do Nothing	Baseline	Baseline	Baseline
Option 1	-5,841	-5,219	-6,191
Option 1A	-1,932	-1,310	-1,330
Reduced disbenefit	-3,909	-3,909	-4,861
	CO_2 equivalent (3.18 conversion)		
Do Nothing	Baseline	Baseline	Baseline
Option 1	-18,574	-16,596	-19,687
Option 1A	-6,144	-4,166	-4,229
Reduced disbenefit	-12,431	-12,431	-15,458
Scenario	Overall Fuel cost (at £356.76/tonne) IATA jet fuel cost USD457.38, USD to GBP 0.78 Rates dated 28 Feb 2020		
Do Nothing	Baseline	Baseline	Baseline
Option 1	-£2,084,000	-£1,862,000	-£2,209,000
Option 1A	-£689,000	-£467,000	-£474,000
Reduced disbenefit	-£1,395,000	-£1,395,000	-£1,735,000

	Average change in fuel cost per flight (LLA Arrivals)			
	Scenario	2022	2032 No DCO	2032 With DCO
	Num flights	70,740	70,740	91,500
Opt 1	t fuel total	-6,330	-6,330	-7,302
	t fuel per flight	-0.089	-0.089	-0.080
	t CO2e per flight	-0.285	-0.285	-0.254
Opt 1A	t fuel total	-2421	-2421	-2441
	t fuel per flight	-0.034	-0.034	-0.027
	t CO2e per flight	-0.109	-0.109	-0.085
Additional cost per flight	£/flt Opt 1	-£31.92	-£31.92	-£28.47
	£/flt Opt 1A	-£12.21	-£12.21	-£9.52
Opt1 minus Opt1A	Reduced disbenefit	-£19.71	-£19.71	-£18.95
	Average change in fuel cost per flight (Stansted Arrivals)			
	Num flights	101,719	102,410	102,410
	t fuel total	489	1,111	1,111
	t fuel per flight	0.005	0.011	0.011
	t CO2e per flight	0.015	0.034	0.034
	£/flt Opt 1	£1.72	£3.87	£3.87
	£/flt Opt 1A	£1.72	£3.87	£3.87

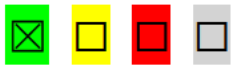


The Sponsors estimate the number of flights per year and the potential cost of delays at the airport. Using a NATS study, they assume that the airline delay costs £3.68/min when the delay is of 15 mins and £53.50/min when the delay is more than 15 mins. It is estimated that in 2022, Option 1A would lead to a net delay avoidance of c 10,200 minutes, which if monetised is equal to £37,500pa (10,200*£3.68). In 2032 the net delay avoidance will raise, and the estimated saving would be of c.11,200 minutes (with or without LLAL's DCO), that if monetised is equal to £41,200pa (11,200*£3,68).

		Not applicable	Qualitative	Quantified	Monetised
3.3.1	Noise		x	x	x
3.3.2	Fuel Burn		x	x	x
3.3.3	CO2 Emissions		x	x	x
3.3.4	Operational complexities for users of airspace		x	x	N/A
3.3.5	Number of air passengers / cargo	x			
3.3.6	Flight time savings / Delays		x	x	x
3.3.7	Air Quality		x		
3.3.8	Tranquillity		x		

3.4 **Are the traffic forecast and the associate impact analysed proportionately and accurately according to available guidelines (e.g. WebTAG or the Green Book?)**

Yes. The Sponsors use the WebTAG tables to estimate the noise and greenhouse gas impacts. To complete the assessment, the fuel burn impact is monetised for the DCO and non-DCO scenarios. The methodology used in this stage is the same applied in Stage 3, the main difference is in the updated underlying data in the fuel forecast and the use of the updated TAG tables. These changes are explained in the narrative and are in line with the CAP 1616 process.



3.5 **What is the total monetised impact of 3.3? (Provide comments)**

The Sponsors provide the total monetised impact of the final option:

- Option 1A without DCO: Net Present Value (NPV) - £10,864,000

Negative values are cost or disbenefit	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Net Present Value
Year	0	1	2	3	4	5	6	7	8	9	10	
Discount factor	1	0.9662	0.9335	0.9019	0.8714	0.8420	0.8135	0.7860	0.7594	0.7337	0.7089	
Option 1A Without DCO												
Net community benefit (Noise)	-£4,678	-£2,718	-£847	£946	£2,670	£4,334	£5,943	£7,501	£9,014	£10,478	£11,893	
Net community benefit (CO_2)	-£48,113	-£46,017	-£43,977	-£41,995	-£40,068	-£38,198	-£36,848	-£35,059	-£33,324	-£33,959	-£34,717	
Net airspace users benefit (CO_2)	-£77,358	-£90,902	-£102,161	-£108,999	-£116,389	-£122,001	-£124,131	-£126,767	-£128,041	-£128,079	-£128,332	
Net airspace users benefit (Fuel costs)	-£689,000	-£667,000	-£645,000	-£623,000	-£600,000	-£578,000	-£556,000	-£534,000	-£512,000	-£490,000	-£467,000	
Net airspace users benefit (Delay)	£37,500	£37,870	£38,240	£38,610	£38,980	£39,350	£39,720	£40,090	£40,460	£40,830	£41,200	
Deployment costs	-£4,130,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	NPV
Present value (rounded to nearest whole £1,000, NPV is sum of unrounded data)	-£4,912,000	-£747,000	-£713,000	-£677,000	-£643,000	-£609,000	-£575,000	-£543,000	-£510,000	-£481,000	-£453,000	-£10,864,000

- Option 1A with DCO: NPV - £10,892,000

Negative values are cost or disbenefit	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Net
Year	0	1	2	3	4	5	6	7	8	9	10	Present
Discount factor	1	0.9662	0.9335	0.9019	0.8714	0.8420	0.8135	0.7860	0.7594	0.7337	0.7089	Value
Option 1A With DCO												
Net community benefit (Noise)	-£4,678	-£2,434	-£291	£1,763	£3,739	£5,646	£7,491	£9,277	£11,013	£12,692	£14,315	
Net community benefit (CO_2)	-£48,113	-£46,017	-£43,977	-£42,171	-£40,241	-£38,397	-£37,107	-£35,371	-£33,688	-£34,361	-£35,162	
Net airspace users benefit (CO_2)	-£77,358	-£90,902	-£102,161	-£109,506	-£116,952	-£122,726	-£125,137	-£128,093	-£129,711	-£129,924	-£130,375	
Net airspace users benefit (Fuel costs)	-£689,000	-£667,000	-£645,000	-£626,000	-£603,000	-£582,000	-£560,000	-£539,000	-£518,000	-£496,000	-£474,000	
Net airspace users benefit (Delay)	£37,500	£37,870	£38,240	£38,610	£38,980	£39,350	£39,720	£40,090	£40,460	£40,830	£41,200	
Deployment costs	-£4,130,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	NPV
Present value (rounded to nearest whole £1,000, NPV is sum of unrounded data)	-£4,912,000	-£747,000	-£713,000	-£680,000	-£645,000	-£612,000	-£578,000	-£546,000	-£515,000	-£486,000	-£458,000	**-£10,892,000**

4. Benefits of ACP					**Status**
4.1	**Does the ACP impact refer to the following groups and how they are impacted by the ACP?**				
		Not applicable	Qualitative	Quantified	Monetised
4.1.1	Air Passengers		x	N/A	N/A
4.1.2	Air Cargo Users		x	N/A	N/A
4.1.3	General aviation users		x	x	x
4.1.4	Airlines		x	x	x
4.1.5	Airports		x	x	x
4.1.6	Local communities		x	x	x
4.1.7	Wider Public / Economy		x	x	x
4.1.8	**Comments:** The proposed final Option 1A requires an increase in the volume of controlled airspace (i.e., 424 nm^2 of CAS), which is 10% less than the one required by Option 1 (i.e., 473nm^2 of CAS) and all CAS would be required at FL75+. The new CAS will be Class C airspace, which is more restrictive than Class G. This means that general aviation users (GA) who fly FL75 and above in the region, will need to request access but there will be a reduced restriction at lower altitudes near Stansted and overall, a lower impact than the one estimated with the consulted Option1. The Sponsors evaluate the impacts on military aviation and states that Option 1A would potentially increase access restriction on the MoD, specifically USAFE operating from RAF Lakenheath and RAF Mildenhall who fly FL75 and above in the region, the Sponsors acknowledge that				

they have worked with USAFE to mitigate impacts on their operation.

		Average change in fuel cost per flight (LLA Arrivals)		
	Scenario	2022	2032 No DCO	2032 With DCO
	Num flights	70,740	70,740	91,500
Opt 1	t fuel total	-6,330	-6,330	-7,302
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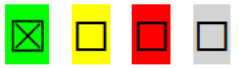
	£/flt Opt 1	£1.72	£3.87	£3.87
	£/flt Opt 1A	£1.72	£3.87	£3.87

In 2032, the impact that the proposed final option will have on commercial airlines and GA is of additional fuel cost of £12,21 per flight if there is no DCO, while assuming a DCO scenario the additional fuel cost is estimated to be around of £9,52 per flight.
The Sponsors clarify that this proposal will not lead to an increase in air transport movements, passenger numbers or cargos.

4.2	**How are the above groups impacted by the ACP, especially (but not exclusively) looking at the following factors: below:**	
4.2.1	Improved journey time for customers of air travel	Positive
4.2.2	Increase choice of frequency and destinations from airport	N/A
4.2.3	Reduced price due to additional competition because of new capacity	N/A
4.2.4	Wider economic benefits	Positive impact from increased effective capacity.
4.2.5	Other impacts	Negative impact in terms of increased noise fuel burn and greenhouse impact compared to the baseline.
4.2.6	**Comments:** The Sponsors state that despite Option 1A leads to longer tracks flown by LLA arrivals compared to the baseline, these arrivals would remain higher for longer due to the revised routing and CAS bases. The Sponsors state that *"the adjustment made to the hold position and route confluence within Option 1A provides additional vectoring space in the region south and east of the hold, meaning that controllers are more likely to be able to bypass the hold such that aircraft are less likely to enter the hold*". Lastly the Sponsors recognise that Stansted arrivals would benefit from the LLA arrivals separation at an early stage.	

4.3	**What is the overall monetised impacts associated with 4.1 and 4.2 the above?** See the answer to Q3.5.
4.4	**What are the non-monetised but quantified impacts of the above? (Insert details of description)** The resilience is one of the impacts that has been evaluated in terms of activities and interventions required for air traffic controllers, i.e. reduced radio exchange from 21-28 (baseline) to 15-20 (proposed option), which is 6-8 fewer than the baseline scenario. Removing 6-8 radio exchanges reduces air traffic controller's workload and improves the network resilience.
4.5	**What are the qualitative / strategic impacts described above?**
4.6	**What is the overall monetised benefits-costs ratio (BCR) of the policy? Is it more than 1?** The monetised benefit/cost ratio of the proposed airspace change is negative since Option 1A without DCO has a NPV - £10,864,000 and Option 1A with DCO has a NPV - £10,892,000. The BCR is less than 1, which means that the proposed airspace change is going to have higher costs than benefits.
4.7	**Have the sponsors provided reasonable justification for the proportionality of analysis above?** Yes, the Sponsors provide appropriate justification for the proportionality used in the assessment. 
4.8	**If the BCR is less than 1, are the quantitative and qualitative strategic impacts proportional to the costs of the ACP?** The BCR is less than 1, which means that the proposed airspace change is going to have higher costs than benefits. However, the Sponsors articulate why this is the case and provided a clear explanation of the strategic improvements that this ACP will bring.

5. Other aspects	
5.1	Nil

6. Summary of Assessment of Economic Impacts & Conclusions	
6.1	This airspace change proposal (ACP) aims to improve the ATC system resilience by introducing a separation in the arrivals at London Luton Airport, by design strictly independent of the arrivals at Stansted Airport and *vice-versa*. The current capacity constraint situation on LLA arrivals will be resolved by separating those arrivals at LLA from the Stansted upstream flow. The proposed final option will provide a significant benefit to controllers and the overall air traffic system by increasing the resilience by up to 30%, including improving safety, reducing delays, and reducing fuel burn and CO2 emissions in case of disruption.

	In the Final Options Appraisal, the Sponsors report the feedback received by the stakeholders, focusing on their preferred option – a slightly modified Option 1, here named Option 1A. The final option (Option 1A) includes the following improvements: • the holding pattern has been moved and the lowest normally useable altitude has been raised by 1,000ft; • some higher-altitude routes have been shortened and kept higher for longer, to reduce the disbenefit in fuel consumption and CO2, and to reduce noise impacts; and • the holding pattern adjustment and route adjustment has increased the likelihood of controllers building an efficient arrival sequence further away and higher up than in the consulted airspace design. The Final Options Appraisal fulfils the minimum requirement for a Level 1 ACP options appraisal, by providing the qualitative and quantitative/monetised analysis for all the relevant criteria as reported in CAP1616 – Table E2 and the cost benefit assessment as per CAP1616 – Table E4. In conclusion the proposed change will lead to a NPV disbenefit of £10,864,000 if the DCO does not progress, while if the DCO progresses the NPV disbenefit is estimated to be £10,892,000.

Outstanding issues?

Serial	Issue	Action required
1		
2		

CAA Initial Options Appraisal Completed by	**Name**	**Signature**	**Date**
Airspace Regulator (Economist)	[redacted]	[redacted]	18/08/2021
Airspace Regulator (Environment)	[redacted]	[redacted]	15/11/2021
Airspace Regulator (Technical)	[redacted]	[redacted]	15/11/2021

ATM – Inspector ATS (Ops)	[redacted]	[redacted]	07/09/2021