

CAA Operational Assessment

Title of airspace change proposal	CAELUS Trial D – Lothian region
Change sponsor	AGS Airports Ltd
Project reference	ACP-2022-104
Account Manager	██████████
Case study commencement date	29 February 2024
Case study report as at	17 June 2024
<p><i>Instructions</i></p> <p>In providing a response for each question, please ensure that the ‘status’ column is completed using the following options:</p> <ul style="list-style-type: none"> • YES • NO • PARTIALLY • N/A <p>To aid the SARG Lead it may be useful that each question is also highlighted accordingly to illustrate what is:</p> <p>resolved YES not resolved PARTIALLY not compliant NO</p>	

Executive Summary
<p>This temporary change for an airspace trial is in support of the CAELUS ConOps which looks to trial various aspects of an ecosystem that could be required to facilitate a drone service for NHS, capable of being scaled to operate nationally. The trials will aim to further understanding of the safe operations of BVLOS and indeed all airspace operations in controlled airspace while validating the important potential improvements in NHS services. The flights for this temporary change within a TDA and where appropriate a TSA. UAS operations will need to scale to meet the demand of the populous associated with conurbations. This temporary change enables the project to evaluate and develop the supporting systems in the round across the whole ecosystem to ensure safe and equitable integration of crewed and uncrewed operations whilst providing NHS staff valuable opportunity to understand how a service might operate and to compare across diverse geographies by working within multiple health boards in Scotland. The TDA and TSA provides the safety of flight for all airspace users with the intention to reduce the segregation as these supporting systems are validated, developed and approved by the regulator.</p>

1.	Justification for change and options analysis (operational/technical)	Status
1.1	Is the explanation of the proposed change clear and understood?	YES
	TDA/TSA complex to allow BVLOS operations between hospitals.	
1.2	Are the reasons for the change stated and acceptable?	YES
	<p>Reasons for the change:</p> <ul style="list-style-type: none"> • NHS Scotland encompassing the Territorial Boards and Scottish Ambulance Service (SAS) views the adoption of Unmanned Aircraft Systems (UAS) or drones as an opportunity to transform the patient experience and reduce the impact of traffic congestion and CO2 emissions. Key to this is the driver of the NHS Scotland Recovery Plan (2021) which highlights the essential need for research, innovation and redesign as integral to the recovery of NHS Services. • CAELUS intend to validate a developed concept of operations around airspace structure and use that is scalable and sustainable. • To utilise volumes of segregated airspace across Scotland in a total of 5 locations to enable us to prove elements of proposed future concept of integrated airspace. 	
1.3	Have all appropriate alternative options been considered, including the 'do nothing' option?	NO
	<p>The sponsor received feedback from BMAA/East of Scotland Microlight site who proposed a route to the east which did not follow the coast which would have had a lesser impact on their low-level training. The rationale the sponsor has provided for not even exploring this option is that the CAA would not support a ground track with potentially higher ground risk than the track over the sea. Having examined the proposed ground track, RPAST confirm that the proposed different route would be worth exploring as it is not clear that the ground risk would be higher.</p> <p>10/06/2024 submission of additional info</p> <p>Following meetings between the sponsor and the CAA on 18/04/24 and 06/06/24 where the CAA indicated that it was still not clear from the proposal what consideration had been given to the proposed alternative route (or one that would impact the stakeholder less while maintaining a high level of safety), the sponsor has included more detail on the rationale for not proposing a different route:</p> <p><i>This route was revisited again on 6 June 24 in conjunction with the CAA to look again at the proposal by East Fortune Airfield/BMAA to further examine a route further south. The decision was still to remain with the proposed route to remain unchanged and following the</i></p>	

coastal route because of these factors on the alternative route:

- *The route goes over land rather than sea so ground risk cannot be mitigated to ALARP.*
- *The route is longer, so higher risk (ground and air, even though in a TDA) through longer "exposure".*
- *As the proposed new routing is longer, it would mean that battery swaps on would be required on both sides of the route and can't do return missions which impacts on the commercial viability significantly as more equipment, people required.*
- *The Approach path from proposed route is more challenging, requiring a tight turn and descent with short back transition leg.*


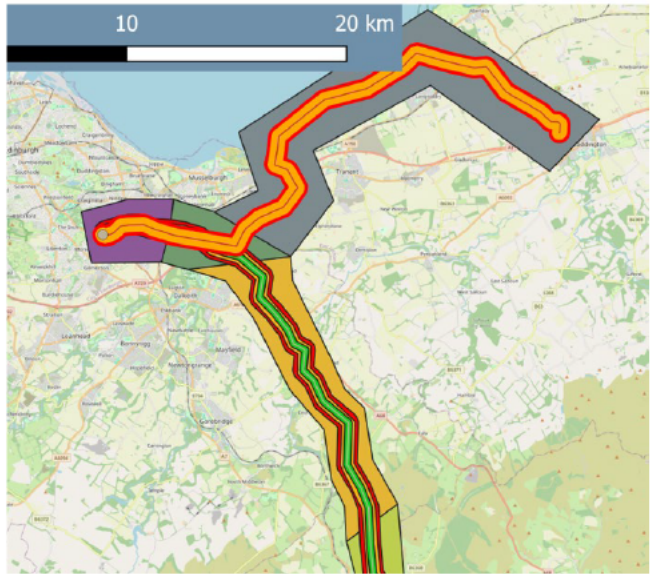
Taking the bullet points in order:

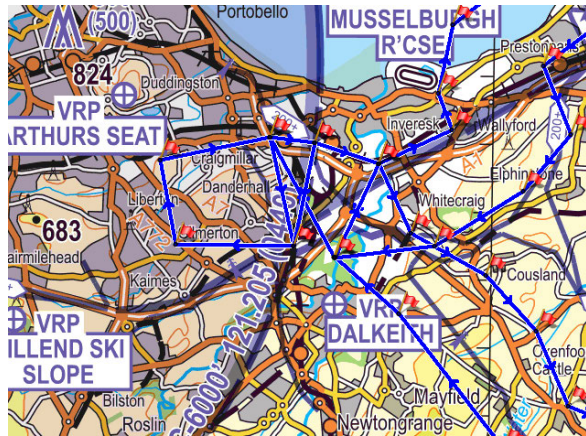
- It does not make sense that just because an alternative route would be entirely over land, the ground risk therefore cannot be ALARP. **The sponsor has not provided any additional evidence to support this position.**
- A route developed by the RPAS team as an example route to the south (which could potentially be further refined) would add less than a minute of flying time to the currently proposed route. **The sponsor has not provided any evidence of the route or routes that they examined to substantiate the statement that an alternative route would be longer than the proposed route.**
- In the RPAS operator's submission to the RPAS Team, they indicate that with the currently proposed route, the aircraft would use 60% of the aircraft's max endurance which would **indicate that battery swap is required for this route anyway** (although the figures do not seem to match when compared to the EDI-Borders route). The sponsor has not provided any evidence of the route or routes that they examined to substantiate the statement that an alternative route would be longer than the proposed route.

Route (Reciprocal)	Distance (Km)	Nominal Operating Height (Ft AGL)	Avg. Cruise Speed (kts)	Est. Time (Mins)	% of Max Endurance (of 46 mins) with max payload	TDA(s) Required
Royal Infirmary of Edinburgh - East Lothian Community Hospital	28	310-380	56	19	60	TDA's 1, 2, 6
Royal Infirmary of Edinburgh - Borders General Hospital	54	328	56	34	73	TDA's 1, 2, 3, 4, 5

- The example route produced by the RPAS team did not use any turns that were tighter than turns already used in the proposed route. **As the sponsor has not provided any evidence of the route or routes that they examined to substantiate the statement that**

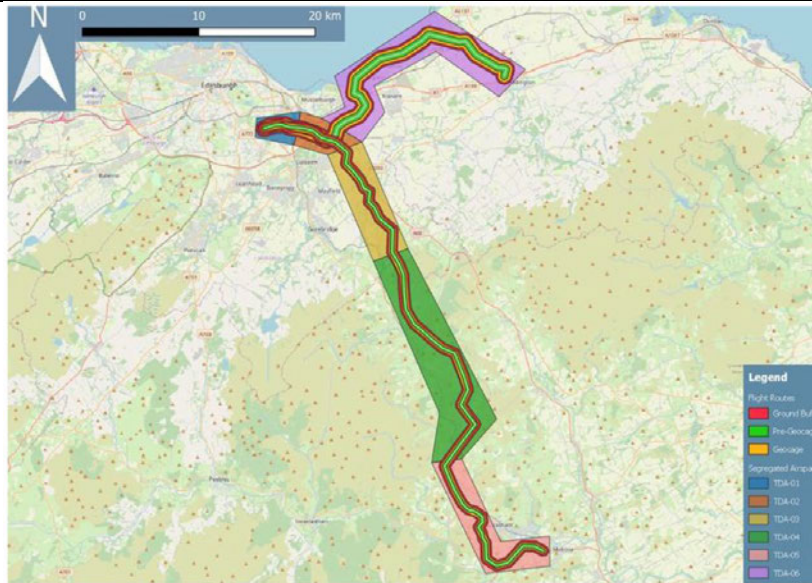
	<p>an alternative route would require tighter turns than the proposed route, the claim cannot be assessed.</p> <p>Given the above, the sponsor has not provided sufficient justification that the proposed route is the most suitable, given the stakeholder feedback received.</p>	
1.4	Is the justification for the selection of the proposed option sound and acceptable?	NO
	<p>Given that the sponsor has not considered the route proposed by the BMAA, it is not clear that the selected option is the most suitable.</p> <p>See 1.3</p>	

2.	Airspace description and operational arrangements	Status
2.1	Is the type of proposed airspace design clearly stated and understood?	YES
	<p>The coordinates provided for the airspace design do not match that provided in the image of the proposed TDA/TSA complex in the proposal or in the draft LoA with between ANSL and Skyports.</p> <div style="display: flex; justify-content: space-around;">   </div>	



10/06/2024 submission of additional info

In a meeting between the CAA and the sponsor on 18/04/24 it was pointed out that the boundary between TDA 3 and TDA 4 only allowed approx. 300ft from ground level to the upper limit of the TDA at 1,400ft AMSL. **Following the resubmission of the proposal, the sponsor provided a mixture of different diagrams of the proposed TDA/TSA complex.** In the final submission the sponsor confirmed that the diagram provided in the ACP and the coordinates were the final proposed design.



The diagram above is the pictorial description of the proposed TDA/TSA complex, but there is still a discrepancy between the proposed design and the design described by the coordinates provided in the draft AIC.



The coordinates describe a boundary between TDA 3 and TDA 4 that still only leaves 300ft of vertical space whereas the diagram suggests that the design is intended to have the boundary further north.

Following the resubmission of the ACP document (v9), the coordinates now match the proposed airspace diagram and can be used to produce the draft AIC if approved. Recommend raising the upper limit of TDA 4 to the nearest 100ft (1700ft from 1650ft) to ensure that the structure is as clear as possible to other airspace users.

2.2	Are the hours of operation of the airspace and any seasonal variations stated and acceptable?				YES
		AM Activation		PM Activation	Comments
	Week One	0700 – 1000 L	or	1300 – 1600 L	<p>The AM timeslot will be utilized solely for Edinburgh to Borders and the PM timeslot will be utilised solely for Edinburgh to East Lothian route.</p> <p>Only one TDA (Route) will be activated at a time.</p> <p>3-6 one-way flights are expected to be completed (1-2 flights per hour)</p> <p>Only one TDA Route will be activated at a time.</p>
	Week Two	0700 – 1000 L	and	1300 – 1600 L	<p>The AM timeslot will be utilized solely for Edinburgh to Borders and the PM timeslot will be utilised solely for Edinburgh to East Lothian route.</p> <p>Only one TDA (Route) will be activated at a time.</p>
	Week Three	0700 – 1000 L	and	1300 – 1600 L	<p>The AM timeslot will be utilized solely for Edinburgh to Borders and the PM timeslot will be utilised solely for Edinburgh to East Lothian route.</p> <p>Only one TDA (Route) will be activated at a time.</p>
	Week Four	0700 – 1000 L	and	1300 – 1600 L	<p>The AM timeslot will be utilized solely for Edinburgh to Borders and the PM timeslot</p>

					will be utilised solely for Edinburgh to East Lothian route. Only one TDA (Route) will be activated at a time.	
	Note 1	Activation periods described above are maximum durations and could be reduced on particular days if not operationally required.				
	Note 2	Danger Area Activity Information Service will be provided by Edinburgh ATC and Scottish Information on the status of the TDAs.				
	Note 3	Skyports will promulgate the TDA activation times and contact details of the Flight Operations Team by NOTAM at least 24 hours before the planned use.				
2.3	Is any interaction with adjacent domestic and international airspace structures stated and acceptable including an explanation of how connectivity is to be achieved? Has the agreement of adjacent States been secured in respect of High Seas airspace changes?					tbc
	<p>The airspace within the Edinburgh CTR and outside will be managed by Edinburgh ATC. Currently, there is no LoA developed to indicate how the unit will manage the airspace.</p> <p>10/06/2024 submission of additional info</p> <p>LoA including updated airspace diagram submitted detailing the proposed procedures between Skyports and ANSL. The LoA seems to indicate that ATC will advise pilots that the TDA sectors are active or not active, based on information provided by Skyports. As the service proposed is a SUA AIS, controllers will only be able to advise pilots of the NOTAMED status of the TDA, not whether the activity within the TDA is ongoing or not.</p> <p>As the TSA is within the Edinburgh CTR, ATC will have the ability to manage the airspace in accordance with the LoA and will deactivate the TSA tactically as required based on position information provided by Skyports.</p>					
2.4	Is the supporting statistical evidence relevant and acceptable?					N/A
2.5	Is the analysis of the impact of the traffic mix on complexity and workload of operations complete and satisfactory?					YES

	<p>The location and volume of the proposed airspace will have a very low impact on the normal operation at Edinburgh. Given that the service provided for the TDA is a SUA AIS and the TSA will be managed in accordance with the proposed LoA (once approved), the impact is satisfactory.</p>	
2.6	<p>Are any draft Letters of Agreement and/or Memoranda of Understanding included and, if so, do they contain the commitments to resolve ATS procedures (ATSD) and airspace management requirements?</p>	<p>PARTIALLY</p>
	<p>10/06/2024 submission of additional info</p> <p>LoA including updated airspace diagram submitted detailing the proposed procedures between Skyports and ANSL. The LoA seems to indicate that ATC will advise pilots that the TDA sectors are active or not active, based on information provided by Skyports. As the service proposed is a SUA AIS, controllers will only be able to advise pilots of the NOTAMed status of the TDA, not whether the activity within the TDA is ongoing or not.</p> <p>As the TSA is within the Edinburgh CTR, ATC will have the ability to manage the airspace in accordance with the LoA and will deactivate the TSA tactically as required based on position information provided by Skyports.</p> <p>Updated draft LoA between Skyports and HEMS/Police operators provided but no evidence provided that this has been agreed by those operators.</p>	
2.7	<p>Should there be any other aviation activity (low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or ATC Procedures can be devised, what action has the change sponsor carried out to resolve any conflicting interests?</p>	
	<p>The sponsor has amended the proposed structure to accommodate some feedback received from the hang-gliding and paragliding community by adjusting the route to the Borders so that it avoids the hang/paragliding site at Eildon Hill and agreed to use this route 7-10am before most cross-country hang/paragliding takes place.</p> <p>The sponsor has proposed an LoA with emergency service helicopter operators but there is no draft LoA in the submitted document set. MOD indicated that there were major exercises planned for July/August and September and that would be impacted if the dates had to be moved to the right.</p> <p>BMAA/East Fortune microlight operations - feedback was received from East of Scotland Microlights (EOSM), which was also on behalf of the BMAA and East Fortune airfield. It was explained that the airspace available for both training and leisure flying was constrained by Edinburgh's airspace to the west, terrain to the south and the Firth of Forth to the north, meaning that most flying takes place in an area bounded by North Berwick, Dunbar, Haddington and Musselburgh. It stated that May and June are the training school's busiest time of the year, with typically 8 hours a day of flying training flights. In terms of this ACP, EOSM explained that the Edinburgh to Borders route would</p>	

	<p>greatly impact their ability to conduct specific low-level navigation exercises, while the Edinburgh to East Lothian route would impact routing along the Firth of Forth shoreline, which is popular with air experience flight customers, and the standard route to East Fortune when transiting the Edinburgh Control Zone. When that route turns south east away from the coast, it impacts more of the airspace available for training.</p> <p>In order to mitigate the impact, EOSM suggested that the Borders route would have significantly less impact if it was moved more to the west, ideally to the west side of the A7 trunk road, and proposed an alternative route to East Lothian which would follow the Borders route until just south of Pathhead, and then route north east to Haddington, which would keep the whole of the coastal area clear and remove the block to the west of East Fortune.</p> <p>In the submission document, the sponsor has stated that 'The specific route adjustments requested by the stakeholder were significant and would compromise the mitigation to ground risk by not using the sea route available'. It went on to state three reasons as to why it decided not to make any adjustments as requested by EOSM. RPAST have indicated that there could be a route with similar ground risk in the area described by the BMAA proposed route. Given that the sponsor has not considered this route or examined its feasibility, this conflict is still unresolved.</p> <p>10/06/2024 submission of additional info</p> <p>As described in section 1.3, the sponsor has provided additional rationale for not proposing an alternative route to East Lothian through TDA 6. The rationale is not accepted as it is not supported by evidence provided by the sponsor.</p>	
2.8	Is the evidence that the airspace design is compliant with ICAO SARPs, airspace design & FUA regulations, and Eurocontrol guidance satisfactory?	YES
	<p>The proposed coordinates describing the airspace structure still do not correlate with the diagram of the proposed structures.</p> <p>V9 of the submission now has coordinate data that matches the proposed structures.</p>	
2.9	Is the proposed airspace classification stated and justification for that classification acceptable?	YES
	No change to classification.	

2.10	Within the constraints of safety and efficiency, does the airspace classification permit access to as many classes of user as practicable?	YES
	No DACS is proposed for this ACP due to lack of radio and radar coverage to be able to be in contact with aircraft that require a DACS at that low level.	
2.11	Is there assurance, as far as practicable, against unauthorised incursions? (This is usually done through the classification and promulgation.)	YES
	Proposed AIC and NOTAM of the activity.	
2.12	Is there a commitment to allow access to all airspace users seeking a transit through controlled airspace as per the classification, or in the event of such a request being denied, a service around the affected area?	YES
	TSA within CAS will be tactically managed by the controlling authority, Edinburgh ATC.	
2.13	Are appropriate arrangements for transiting aircraft in place in accordance with stated commitments?	PARTIALLY
	LoAs between the operator and ANSL and between the operator and emergency service operators still need to be finalised and approved.	
2.14	Are any airspace user group's requirements not met?	YES
	See 1.3	
2.15	Is any delegation of ATS justified and acceptable? (If yes, refer to Delegated ATS Procedure).	N/A

2.16	Is the airspace design of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to contain horizontal and vertical flight activity (including holding patterns) and associated protected areas in both radar and non-radar environments?	tbc
	RPAS team to confirm. The latest amendment to the route appears to route right up against the edge of the airspace structure with the ground risk buffer not contained within the proposed structure at that point.	
2.17	Have all safety buffer requirements (or mitigation of these) been identified and described satisfactorily (to be in accordance with the agreed parameters or show acceptable mitigation)? (Refer to buffer policy letter.)	tbc
	The sponsor is requesting dispensation from the Buffer Policy as the proposed airspace structures are within and adjacent to controlled airspace. As Edinburgh ATC are the controlling authority for the CAS and have procedures in place to manage the risks associated with the activity and provided the activity can be contained (see above), dispensation from the Buffer Policy should be granted in this case.	
2.18	Do ATC procedures ensure the maintenance of prescribed separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures?	N/A
2.19	Is the airspace structure designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace?	YES
	Given the discrepancy between the coordinate data and the pictorial description of the airspace structures, it is not clear that the airspace provides suitable terrain clearance for the proposed operation. V9 of the submission includes coordinate data that now matches the proposed structures.	
2.20	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, have appropriate operating arrangements been agreed?	N/A

2.21	Where terminal and en-route structures adjoin, is the effective integration of departure and arrival routes achieved?	N/A

3.	Supporting resources and communications, navigation and surveillance(CNS) infrastructure	Status
3.1	Is the evidence of supporting CNS infrastructure together with availability and contingency procedures complete and acceptable? The following are to be satisfied:	tbc
	<ul style="list-style-type: none"> Communication: Is the evidence of communications infrastructure including RT coverage together with availability and contingency procedures complete and acceptable? Has this frequency been agreed with AAA Infrastructure? 	YES
	Communication between Skyports and ANSL will be by telephone.	
	<ul style="list-style-type: none"> Navigation: Is there sufficient accurate navigational guidance based on in-line VOR 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? For example, for nav aids, has coverage assessment been made, such as a DEMETER report, and if so, is it satisfactory? 	tbc
	The proposed design of the route brings the aircraft extremely close to the edge of the proposed airspace structure in certain places. RPAS team to confirm suitability of navigation equipment utilised by Skyports.	
	<ul style="list-style-type: none"> Surveillance: Radar provision – have radar diagrams been provided, and do they show that the ATS route/airspace structure can be supported? 	N/A
3.2	Where appropriate, are there any indications of the resources to be applied, or a commitment to provide them, in line with current forecast traffic growth acceptable?	YES

	Edinburgh ATC have agreed to provide a SUA AIS and to tactically manage the TSA within the Edinburgh CTR.
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4.	Maps/charts/diagrams	Status
4.1	<p>Is a diagram of the proposed airspace included in the proposal, clearly showing the dimensions and WGS84 co-ordinates?</p> <p>(We would expect sponsors to include clear maps and diagrams of the proposed airspace structure(s) – they do not have to accord with aeronautical cartographical standards (see airspace change guidance), rather they should be clear and unambiguous and reflect precisely the narrative descriptions of the proposals.)</p>	YES
	<p>The diagram does not match the coordinate description.</p> <p>V9 of the submission includes coordinate data that now matches the proposed structures.</p>	
4.2	<p>Do the charts clearly indicate the proposed airspace change?</p> <p>See above.</p>	
4.3	<p>Has the change sponsor identified AIP pages affected by the change proposal and provided a draft amendment?</p> <p>Information will be published as an AIC</p>	YES
4.4	<p>Has the change sponsor completed the WGS84 spreadsheet and submitted to the CAA for approval?</p>	N/A

5.	Operational impact	Status
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5.1	Is the change sponsor's analysis of the impact of the change on all airspace users, airfields and traffic levels, and evidence of mitigation of the effects of the change on any of these, complete and satisfactory? Consideration should be given to:	NO
	a) Impact on IFR General Aviation traffic, on Operational air traffic or on VFR General Aviation traffic flow in or through the area.	NO
	See 1.3	
	b) Impact on VFR Routes.	N/A
	c) Consequential effects on procedures and capacity, i.e. on SIDs, STARs, holds. Details of existing or planned routes and holds.	N/A
	d) Impact on airfields and other specific activities within or adjacent to the proposed airspace.	
	See 1.3	
	e) Any flight planning restrictions and/ or route requirements.	N/A
5.2	Does the change sponsor consultation material reflect the likely operational impact of the change?	YES

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Case study conclusions – to be completed by Airspace Regulator (Technical)	Yes/No
Has the change sponsor met the SARG airspace change proposal requirements and airspace regulatory requirements above?	PARTIALLY
<p>The proposed structures (TSA and TDA) ensure that the BVLOS activity is segregated from other airspace users, allowing the sponsor and their partners to evaluate the operations in relation to their objectives. The sponsor has not provided evidence that an alternative route that would limit the impact on East of Scotland Microlights has been sufficiently considered.</p> <p>The likely impact of the TSA/TDA to enable the activity between Edinburgh and Borders is low due to the altitude of the structures and the short period of time that they are to be used for (4 weeks, 0700-1000L).</p>	

RECOMMENDATIONS/CONDITIONS/PIR DATA REQUIREMENTS	Yes/No
Are there any Recommendations which the change sponsor should try to address either before or after implementation (if approved)? If yes, please list them below.	
<p>To reduce the impact on other airspace users and in accordance with FUA principles, the sponsor should deactivate the TDAs at the earliest opportunity should they no longer be required.</p>	
Are there any Condition(s) which the change sponsor must fulfil either before or after implementation (if approved)? If yes, please list them below.	

The sponsor must resubmit the LoA between Skyports and ANSL once the draft removes any reference to a SUA AIS being provided on information provided by the operator. The activity status of the TDA provided by the SUA AIS must reflect the NOTAM published for the TDA. If the NOTAM is published and it is during the time published in the NOTAM, the activity status of the TDA should be advised as active. If the NOTAM has been cancelled or the time is outside of the time published in the NOTAM, the status should be advised as not active.

The sponsor must submit evidence that the wording of the LoA between Skyports and emergency service operators has been agreed by those operators.

The Operational Safety Case for this activity shall be accepted and an Operational Authorisation (OA) granted prior to any NOTAMs being promulgated to activate the TDAs.

These conditions must be fulfilled before flying can commence.

Are there any specific requirements in terms of the data to be collected by the change sponsor for the Post Implementation Review (if approved)? If yes, please list them below.

YES

- Collect information on any issues identified with the management of the TSA and its impact on BVLOS operations
- Collect information on what information ATC or RPs could benefit from in future deployments of TSA in controlled airspace. This may be information that could be displayed to an ATCO or RP or could be utilisation of information from ground-based sensors.
- Collect information from participants on altitude references (Baro/GPS) and any impact of altitude reference to the flying operation.

General summary

The sponsor has developed a complex of airspace structures to contain BVLOS RPAS activity to demonstrate the feasibility of the transport of essential medicines, bloods and other medical supplies throughout Scotland. The objectives of the trial are to:

- a) Demonstrate safe integrated BVLOS operations in the vicinity of commercial airport operations inside Controlled Airspace
- b) Determine level of impact for crewed aviation
- c) Demonstrate UA Remote Pilot (RP) can communicate with ATC to ensure airspace is only segregated when absolutely necessary, minimising impact to other airspace users.
- d) Demonstrate the UTM capabilities that could enable upscaling and integration in the future through adoption of technology (such as sharing of flight intent data, mission requests, conformance monitoring)
- e) Produce final report which can be used by CAA to enable a pathway to regulation.

The sponsor has proposed an appropriate structure in part, but has not demonstrated that the feedback received in relation to the route between Edinburgh and East Lothian has been sufficiently considered so as to mitigate the impacts of the proposal on some stakeholders.

The proposed structures (TSA and TDA) ensure that the BVLOS activity is segregated from other airspace users, allowing the sponsor and their partners to evaluate the operations in relation to their objectives. Upper limit of proposed TDA 4 should be raised to nearest 100ft (1700ft from 1650ft).

The likely impact of the TSA/TDA to enable the activity between Edinburgh and Borders is low due to the altitude of the structures and the short period of time that they are to be used for (4 weeks, 0700-1000L).

Comments and observations

Given the lack of sufficient evidence to justify the sponsor's position that an alternative route that mitigated EOSM impact was not feasible (see section 1.3), I would recommend that the route to East Lothian is not approved.

Operational assessment sign-off	Name	Signature	Date
Operational assessment completed by Airspace Regulator (Technical)	[REDACTED]	[REDACTED]	17/06/2024
Principal Airspace Regulator comment / Decision	Name	Signature	Date
Operational assessment conclusions approved by Principal Airspace Regulator	[REDACTED]	[REDACTED]	17/06/2024

Principal Airspace Regulator Comments and Decision: