



Ministry  
of Defence

**ACP-2020-24**

**E-7 WEDGETAIL OPERATING AREAS**

**GATEWAY DOCUMENTATION:  
STAGE 2 DEVELOP & ASSESS**

**STEP 2B OPTIONS APPRAISAL, (PHASE I); INITIAL**

## Drafting and Publication History

<b>Issue</b>	<b>Date</b>	<b>Change Summary</b>
V1.0	9 Feb 23	Submitted to CAA
V2.0	22 Mar 23	Amendments following CAA feedback on V1.0

<b>Revision Number</b>	<b>Affected part</b>	<b>Revised By</b>	<b>Notes</b>
V1.0	N/A	Project Lead	Initial Issue
V2.0	Environmental Impact	Project Lead	Page 4 - Updated
V2.0	Economic Assessment	Project Lead	Page 5 - Updated
V2.0	Comparison Table 1	Project Lead	Pages 7-10 - Updated. Options 0, 1 and 2 re-assessed and revised
V2.0	Conclusion	Project Lead	Page 11 - Updated

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## Introduction

### Where are we in the Airspace Design Process?

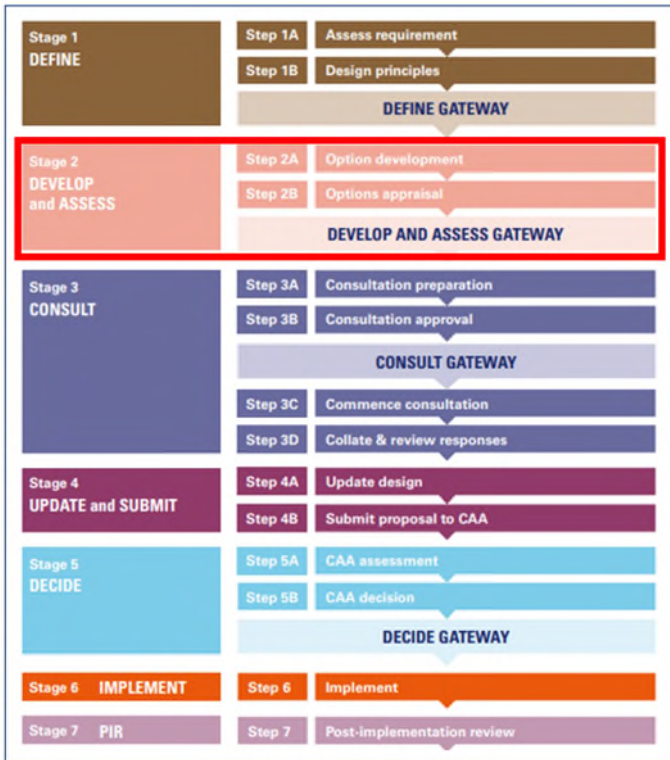


Figure 1. CAP1616 Airspace Change Process

Following the initial CAP1616 *Stage 1 – Define* phase, we are now in *Stage 2 – Develop and Assess*, whereby we (the ISTAR Force as the change sponsor) is looking to establish one or more options to meet the Statement of Need (SoN – detailed later), aligned with the design principles agreed during stage 1. We will then look to make an appraisal of the impact, both positive and negative, of the potential options.

### What was the statement of need for this proposal?

Currently the E-3D Sentry AEW Mk 1 utilises the UK AEW areas for UK training and operations. In 2023<sup>1</sup> the E-7 Airborne Early Warning Wedgetail Mk 1 will enter RAF service. Though fulfilling the same role as the Sentry, advances in technology mean that the Wedgetail will not be able to utilise exactly the same orbit areas. The Wedgetail will be required to fly approximately 100 nm by 20 nm racetracks. Best use can be made of some of the existing orbit areas (e.g. UK 1, 7 and 9) as they are both large enough to accommodate the Wedgetail flight profile and are appropriately located to enable Wedgetail to provide a service to its forecast traffic and trade. The existing orbit areas may still be utilised by NATO/visiting forces partners as the UK will retain its NATO commitment in this respect. Therefore, whilst the extant orbit areas must remain in place for the time-being, there is a requirement for new orbit areas to be created where the current areas are not sufficient.

### Design Principles

DP ID	Agreed Design Principle
a	Must be safe. The defined airspace must provide ATS providers a known traffic environment to ensure safe separation against GAT.
b	Defined areas must be sufficient in location to achieve training and operational objectives.
c	Defined areas must be the minimum dimension to achieve task.

<sup>1</sup> E-7 In Service Date (ISD) has moved to Q3/4 2024.

d	Minimise the impact to Commercial Air Traffic flow, sector complexity and sector capacity.
e	Airspace management and FUA principles will be applied to ensure collaborative decision-making protocols and management processes are established.
f	Defined areas shall not be segregated airspace but will align to current or revised procedures detailed within current NATS/MOD interface documents.
g	The defined areas will detail the separation standard required between GAT and the OAT using the designated area.
h	The design shall seek to rationalise existing areas where appropriate.
i	The design shall minimise the impact on all ATM stakeholders. This will include NATS and other ANSPs (including foreign ANSPs) so as not to over complicate airspace, sector design and service provision.

## Noise, environmental, and other costs and benefits

### Frequency of Activation

As detailed in Stage 2A, it is expected that E-7 area activation will be in support of one sortie per day for a period of approximately 8 hours. During a sortie, an E-7 may use more than one area. It is assessed that UK E coast areas will be used more than those elsewhere in the UK due to training requirements and support provided to RAF and USAFE fast jet training.

Weekend activation is only likely to be for major exercise activity or for national security requirements.

### Noise

The Department for Transport Air Navigation Guidance 2017 details the Government's altitude-based guidance.

- It clearly states that for all changes to airspace with no impact below 7000 feet the CAA should prioritise the reduction of aircraft CO<sub>2</sub> emissions and the minimising of noise is no longer the priority; **The sponsor invites CAA to agree that this proposal constitutes a Level M2 in line with this guidance.**

### Environmental Impact

The Air Navigation Directions 2017 enable the CAA to disregard the environmental impacts of military aircraft when the proposal has been submitted by, or on behalf of, the MoD. However, the CO<sub>2</sub> emissions of civil aircraft re-routing because of the proposed change must be assessed. A qualitative assessment has already been conducted and the Sponsor will evaluate whether quantitative analysis, via WEbtag or other means, is needed at Stage 3.

The acceptance and introduction of dedicated E-7 operating areas should negate the requirement for civilian airline traffic being re-routed. The areas are non-segregated so airliners can be routed through them. Without these dedicated areas re-routing, additional track miles and increased CO<sub>2</sub> emissions are more likely to occur. Moreover, the E-7 can climb or descend within its dedicated area to avoid civilian traffic, negating additional fuel burn by airliners. As a result, there should be no net increase in CO<sub>2</sub> emissions as a result of this airspace change proposal. This is a qualitative assessment; it is not anticipated that a quantitative assessment is needed, if it is deemed necessary then this will be conducted during Stage 3.

For context, baseline E-3 operations over the past 10 years have seen a single sortie per day varying in duration from 3-10 hours with an average of 8 hours. E-7 operations are anticipated to equate to this with one sortie per day of circa 8 hours duration. Introduced in the 1990s, the E-3 design is based on a 1970s airliner. The RAF E-3D variant entered service in 1991 with later generation engines (4 x CFM 56-2A-3) which emitted less CO<sub>2</sub> than the

NATO variant. The E-7 is based on the Boeing 737-800 with modification. This aircraft has only 2 engines which are significantly more efficient and will generate less CO2 than the older E-3 engines. As a result there will be a net reduction in CO2 emissions with the introduction of the E-7 Wedgetail. Whilst the CAA does not require the MOD to qualify the impacts of CO2 emissions on their aircraft the sponsor feels this point is worthy of note.

### **10 Year Forecast**

It is anticipated that sortie rates for the E-7 fleet will not increase at all in the 10 years post in service date. This is predicated on annual flying rates mandated by the Royal Air Force. Whilst there is some ongoing discourse about an increase in the fleet size from 3 aircraft to 5 (should this ever be achieved) it is assessed that this would not result in increased E-7 flying within the London and Scottish UIRs as the additional flying hours would predominantly come with deployment of the capability to overseas locations.

Whilst civilian air traffic is likely to increase over the next 10 years, E-7 operations are likely to remain constant at one sortie per day. As a result, whilst CO2 emissions from civilian air traffic will likely increase over this period, it will not be as a result of this proposed ACP.

### **NATS Assessment on Quantitative Modelling**

In consultation with NATS (see Annex A), they highlighted the following:

*“In summary the time, cost and complexity required to produce any data would not be proportionate to the change. Clearly there will be some Operational impact and we look forward to continuing our discussions on this and will, of course, provide formal feedback in to the ACP process via your consultation.”*

### **Economic Assessment**

This ACP proposes the establishment of E-7 airspace alongside existing E-3 operating areas. Given that the operation of this airspace will not be significantly different from that of the existing E-3 areas it is assessed that there will be no economic costs incurred beyond those already budgeted for on an annual basis, in summary no financial change to the extant baseline option. Furthermore, as the airspace vertical limits are FL270 - FL330 no economic costs should be incurred by airports, Air Navigation Service Providers, or airlines (training and logistical costs). Should it become apparent during the Stage 3 Consult phase that additional stakeholders have an input that may incur financial costs as a result of the implementation of this ACP then the sponsor will conduct a qualitative assessment on the proposed change.

### **Airspace Change Proposal Classification**

The changes proposed in this ACP affect civil aviation traffic patterns at 7000' or above and is therefore expected to be classified as M2. For the environmental assessment of a level M proposal, the Ministry of Defence need only ever assess the anticipated environmental impacts of the consequential changes on civil aviation patterns.

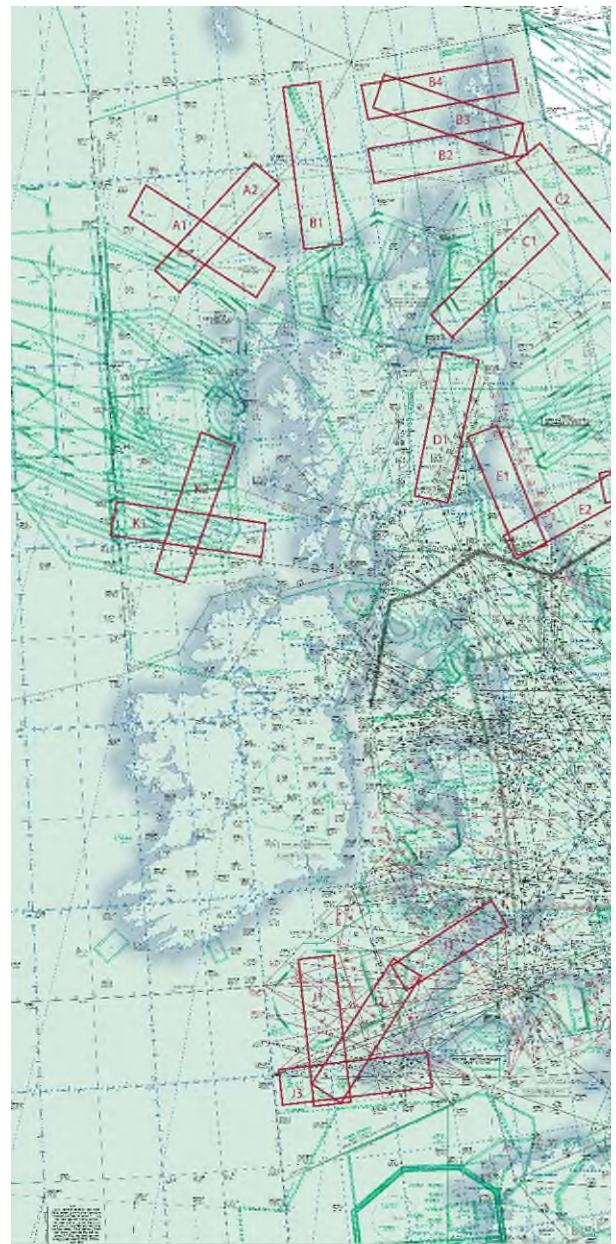
## Options Appraisal

### “Do nothing/Do minimum” against Dedicated E-7 Areas

**Figure 1. Existing E3 Orbit locations and MDAs**



**Figure 2. Proposed E-7 Areas**



Figures 1 and 3 show the existing E3 orbit areas (highlighted in blue) and MDAs whilst Figures 2 and 4 show the proposed E-7 areas (highlighted in red). The existing areas will remain to support NATO E-3 operations until the planned withdrawal from service of the NATO E-3 fleet in 2035. Both the “Do nothing” and “Do minimum” options are assessed against the proposed generation of “Dedicated E-7 areas” in Table 1.

**Figure 3. Existing E-3 Orbit locations and MDAs**



**Figure 4. Proposed E-7 Areas**



**Table 1. Comparison Table**

Group	Impact	Level of Analysis
Communities	Noise impact on health and quality of life	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
The operating heights of the extant E-3 areas are FL270-FL350. It is therefore assessed that there would be no noise impact on health and quality of life - this is outside the scope of this metric.	The operating heights for modified E-3 areas/MDA are in the band FL270-FL350. It is therefore assessed that there would be no noise impact on health and quality of life - this is outside the scope of this metric.	The operating heights of the proposed E-7 areas are in the band FL270-FL350. It is therefore assessed that there would be no noise impact on health and quality of life – this is outside the scope of this metric.
Group	Impact	Level of Analysis
Communities	Air Quality	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>

The operating heights of the extant E-3 areas are FL270-FL350. It is therefore assessed that there would be no air quality issues - this is outside the scope of this metric.	The operating heights for modified E-3 areas/MDA usage are in the band FL270-FL350. It is therefore assessed that there would be no air quality issues - this is outside the scope of this metric.	The operating heights for the proposed E-7 areas are in the band FL270-FL350. It is therefore assessed that there would be no air quality issues - this is outside the scope of this metric.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Wider Society	Greenhouse gas impact	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
With continued use of the E-3 operating areas airliners could be routed in advance to avoid them or be allocated a transit FL that negates a climb or descent to transit through them (non-segregated airspace). This would result in negligible additional fuel burn and have a negligible increase in greenhouse gas impact.  Note: E-7 will represent a reduction in CO2 emissions against E-3D given more efficient engines.	With modified E-3 areas/MDAs airliners may encounter some route deviations (dimensions of modified areas not known in advance/random areas). This would result in additional track miles, additional fuel burn and an increase in greenhouse gas impact.  Note: E-7 will represent a reduction in CO2 emissions against E-3D given more efficient engines.	With dedicated E-7 operating areas airliners could be routed in advance to avoid them or be allocated a transit FL that negates a climb or descent to transit through them (non-segregated airspace). This would result in negligible additional fuel burn and have a negligible increase in greenhouse gas impact.  Note: E-7 will represent a reduction in CO2 emissions against E-3D given more efficient engines.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation	Access	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
The operating heights within the extant E-3 operating areas and the proposed E-7 areas are in the band FL270-FL350. It is therefore assessed that there would be no impact on General Aviation - this is outside the scope of this metric.	The operating heights for the modified E-3 areas/MDAs and the proposed E-7 areas are in the band FL270-FL350. It is therefore assessed that there would be no impact on General Aviation - this is outside the scope of this metric.	The operating heights for the proposed E-7 areas are in the band FL270-FL350. It is therefore assessed that there would be no impact on General Aviation - this is outside the scope of this metric.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation/Commercial Airlines	Economic impact from increased effective capacity	Qualitative
<b>Evidence Analysis</b>		



<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
Outside the scope of this ACP.	Outside the scope of this ACP.	Outside the scope of this ACP.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Fuel Burn	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
With extant E-3 operating areas airlines could be routed in advance to avoid them or be allocated a transit FL that negates a climb or descent to route through them (non-segregated airspace). This would result in negligible additional fuel burn. Moreover, the E-7 can climb or descend to ensure airlines can maintain their allocated FL through the operating area.	With modified E-3 areas/MDAs airlines may encounter some route deviations (dimensions of modified areas not known in advance/random areas). This would result in additional track miles, additional fuel burn and an increase in greenhouse gas impact.	With dedicated E-7 areas airlines could be routed in advance to avoid them or be allocated a transit FL that negates a climb or descent to route through them (non-segregated airspace). This would result in negligible additional fuel burn. Moreover, the E-7 can climb or descend to ensure airlines can maintain their allocated FL through the operating area.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Training Costs	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
No additional training costs to commercial airlines as a result of using the extant E-3 operating areas.	No additional training costs to commercial airlines as a result of using the modified E-3 areas/MDAs.	No additional training costs to commercial airlines as a result of using this airspace option as they will be operationally similar to E-3 orbit areas.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Other Costs	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
No additional costs to commercial airlines as a result of using the extant E-3 operating areas.	No additional costs to commercial airlines as a result of using the modified E-3 areas/MDAs.	No additional costs to commercial airlines as a result of using this airspace option.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Infrastructure costs	Qualitative

<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
No additional infrastructure costs to airports or air navigation service providers as a result of using the extant E-3 operating areas.	No additional infrastructure costs to airports or air navigation service providers as a result of using the modified E-3 areas/MDAs.	No additional infrastructure costs to airports or air navigation service providers as a result of using this airspace option. Radar maps and charts will be updated in line with the AIRAC cycle. Therefore no additional costs (routine update process).
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Operational Costs	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
No additional operational costs to airports or air navigation providers as a result of using the extant E-3 operating areas.	No additional operational costs to airports or air navigation providers as a result of using the modified E-3 areas/MDAs.	No additional operational costs to airports or air navigation providers as a result of using this airspace option.
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Deployment Costs	Qualitative
<b>Evidence Analysis</b>		
<b>Do-nothing (Option 0)</b>	<b>Do-minimum (Option 1)</b>	<b>E-7 Areas (Option 2)</b>
No additional deployment costs to airports or air navigation service providers as a result of using the extant E-3 operating areas.	No additional deployment costs to airports or air navigation service providers as a result of using the modified e3 areas/MDAs.	No additional deployment costs to airports or air navigation service providers as a result of using this airspace option.

## Safety Assessment

This section provides a brief qualitative overview of the impact of this proposal on aviation safety. The evidence feeding into this safety assessment is based upon MOD and NATS incident reporting (DASORs/Airprox's) and engagement with E-3 crews who have successfully operated safely in the current structure in the UK. This assessment covers operating in the current E-3 orbits and the proposed E-7 areas but does not include the transit to/from the orbit which would be undertaken using MOD/Civ ATC services. The proposed sortie rate and duration of the E-7 is similar to the E-3 so no additional workload should be placed on crews or controllers.

The E-3 has operated safely in the current UK orbit structure for over 30 years. Notification of the required orbit is passed to Swanwick Mil by a Military Pre-note/F2919 approx 2 hours prior to departure by the operating crew. This data is therefore available to both Mil and Civ ATC in a timely manner allowing sufficient time for safe planning and co-ordination against other traffic. Once established in the operating area the crew will maintain their allocated FL allowing any conflicting traffic to be routed safely around the area laterally or vertically

(airspace is non-segregated and not restricted). Separation once established in the operating areas is provided by Swanwick Mil ATC in liaison with the Civilian sector; additionally, the E-7 is equipped with TCAS to further enhance safety and avoid conflict. The aircraft also generates its own air picture with any conflicting aircraft (within 10nm or 2000ft) being called to the pilots to enhance their SA and overall safety awareness.

The proposed E-7 area structure has, wherever possible, being absorbed within the current E-3 orbit structure to maintain SA for ATS and limit the change to known safe operating areas/procedures. On some occasions the new E-7 areas extend slightly outside the current operating areas, but orientation has been taken into account to limit the effect on ATS whilst maintaining the op requirement for the E-7 MESA radar. Where new areas have been created their locations have been designed to have minimal impact on the civ sector, thus reducing potential conflict and enhancing air safety. It has not been possible to totally isolate the proposed E-7 areas from other Mil traffic requirements, however, when this conflict occurs, operating within an MDA or in close proximity to an Air-to-Air Refuelling Area (AARA) for example both the E-7 and conflicting Mil traffic will be coordinated to ensure safe separation by the same ATS.

In summary, safe operation within the new E-7 area structure will be achieved by Swanwick Mil but enhanced by TCAS and the E-7's own sensor. The new areas have been overlaid where possible with E-3 orbits and consideration given to positioning new areas away from civ traffic routes to reduce potential conflict and enhance air safety.

### Conclusion

There are minimal financial and other costs involved in the introduction of dedicated E-7 areas. There are also several advantages; these include safety, operational effectiveness, flexible use of airspace and environmental savings. Finally, the creation of dedicated E-7 operating areas allows the MOD to position this air system in the optimum geographical location to maximise the effectiveness of its advanced MESA radar ensuring all training, operational and defence tasks are met. **As such, Option 2 is the preferred option of the Sponsor.**

	<b>Option</b>	<b>Description</b>
0	Do Nothing	Operate in extant E-3 orbits. This will limit the operational effectiveness of the E-7 Wedgetail sensor, hindering its ability to fulfil defence tasks. In summary, the E-7 would operate in the same manner and areas as the E-3.
1	Do Minimum	Operate in MDAs and modified E-3 areas. This will limit the operational effectiveness of the E-7 Wedgetail sensor, hindering its ability to fulfil defence tasks. In many instances, operation outside of the extant E-3 orbits would be required as the current areas are too small. This would reduce predictability and planning for other airspace users, increase complexity and workload for ATS units and limit the tactical effectiveness of the E-7.
2	Create dedicated E-7 areas	Create new E-7 Wedgetail areas, predominantly co-located with existing AEW orbit areas. This option meets all the DPs, enhances safety, reduces complexity, maintains the predictable traffic environment and meets the operational requirements of the MOD.

## Next Steps

This document will be submitted to the CAA as evidence to support the ACP 2020-24 Stage 2B. It is part of the documentary evidence for the Stage 2 assessment gateway (document deadline 10 Feb 23, for the CAA assessment gateway scheduled for 24 Feb 23).

The following CAP 1616 timeline is anticipated.

<b>Event as per CAP1616</b>	<b>Planned Date</b>
Stage 3 CONSULT	26 May 23
Stage 4 UPDATE and SUBMIT	27 Oct 23
Stage 5 DECIDE	12 Jan 24
Stage 6 IMPLEMENT	Apr 24

ANNEX A: UC ACP 2020-24 E7 Wedgetail - Impact analysis discussion

**ANNEX A: UC ACP 2020-24 E7 Wedgetail - Impact analysis discussion**

**Archived:** 30 January 2023 20:37:59

**From:** [Redacted]

**Sent:** 07 September 2022 16:27:59

**To:** [Redacted]

---

**Cc:** [Redacted] ([Air-1Gp-ISTAR E7B SO3Pers](#)); [Redacted]; [Redacted]

**Subject:** RE: UC ACP 2020-24 E7 Wedgetail - Impact analysis discussion

**Sensitivity:** Normal

[Redacted]

As discussed at our meeting this morning re: analytics for E7 airspace:

- I have sought input internally over the last few weeks and our Analytics team have come to the following conclusion.
- The view is that it is not possible to accurately assess the environmental impact of E7 airspace and therefore it is an ineffective use of time and effort to perform any such task. The main constraining factors being:

The proposed airspace is not segregated from the network (and so does not affect the pre-tactical or flight planning aspects which would normally be assessed to measure any change to the current baseline) As it is only the aircraft that needs to be deconflicted from GAT, the airspace and aircraft are coordinated on a tactical basis between Mil and Civil ATC as and when required, at a mutually convenient level in the confines of the lateral airspace. The tactical nature and multiple variables at play here including multiple locations, time of day, required/requested levels, GAT / Network demand and frequency for example; adds significant complexity.

It is our view that at best, and if even possible, any analytics would be excessively complex and unreliable to the point that the effort required would be prohibitive and any output would come with a number of CAVEATS that would make it open to challenge.

In summary the time, cost and complexity required to produce any data would not be proportionate to the change. Clearly there will be some Operational impact and we look forward to continuing our discussions on this and will, of course, provide formal feedback in to the ACP process via your consultation.

I'm sorry that we are unable to help on this occasion.

Regards

[Redacted]



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ATM Development  
Military Interface Lead  
Airspace & Future Operations

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Working remotely until further notice

C2-11

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