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Future Combat Airspace, ACP-2020-026:

STAGE 4A, Update Design

Options Appraisal (Phase III - Final)

Initial Issue

References

Ref no.	Description	Hyperlink
1	Stage 1 Statement of Need	Link to document
2	Stage 1 Assessment Meeting Minutes	Link to document
3	Stage 1 Design Principles	Link to document
4	Stage 2 Design Options	Link to document
5	Stage 2 Design Principle Evaluation	Link to document
6	Stage 2 Initial Options Appraisal and Safety Assessment	Link to document
7	Stage 3 Consultation Strategy	Link to document
8	Stage 3 Consultation Document	Link to document
9	Stage 3 Full Options Appraisal	Link to document
10	Stage 3 Collate and Review	
11	Stage 4 Final Options Appraisal	
12	Airspace change: Guidance on the regulatory progress CAP 1616	Link to document
13	UK Government Department for Transport's 2017 Guidance to the CAA on its environmental (abbreviated to ANG2017)	Link to document
14	ACP-2021-048 Future Combat Airspace - Interim Solution	Link to document
15	ACP-2020-042 Future Combat Airspace Trial	Link to document
16	ACP-2021-007 Future Combat Airspace Interim Solution	Link to document
17	Citizen Space Portal	Published Responses

Notes

This publication provides notification of a Ministry of Defence sponsored proposal for the creation of a new portion of segregated *Special Use Airspace in the form of a Danger Area* in which military exercises involving large numbers of different aircraft types can train for operations. The Change Sponsor for this proposal resides within 11 Group, A7.

Roles

Action	Role	Date
Produce	11Gp, A7	21 Jul 23
Review	DAATM	21 Jul 23

Drafting and Publication History

Version	Date	Change Summary
Initial Issue	21 Jul 23	

Contents

Introduction

i. This document contributes towards Stage 4 of the Civil Aviation Publication (CAP 1616) Airspace Change Process for ACP-2020-026, which aims to facilitate the usage of Combat Airspace by the United Kingdom and coalition partners during infrequent but planned large scale, highly complex training exercises that are used to prepare aircrew for operational environments.

ii. The aim of this document is to provide evidence to the CAA that the Sponsor has adhered to the process defined in CAP 1616 for Stage 4. It builds upon the work undertaken during the Full Options Appraisal (Stage 3, Phase II – Full) by considering the requirement for any refinements or changes because of the Stage 3C Consultation with Stakeholders. Ultimate analysis of the proposed airspace design option will be completed prior to the final submission.

iii. ***Stage 3 – Full Options Appraisal, Phase II.*** *The Full Options Appraisal (Ref 9) at Stage 3 evaluated just one preferred airspace design option against the baseline (do-nothing) option. As per CAP 1616 the Sponsor had previously stated that this was the MOD's preferred design option.*

iv. ***Stage 4 – Final Options Appraisal, Phase III.*** *The Final Options Appraisal is an evolution of the Full Options Appraisal. At Stage 3 the Sponsor proposed just one preferred design option as part of the Stage 3 Consultation. Following analysis of the feedback received during the 13-week Consultation period (6 February 2023 – 8 May 2023), the Sponsor determined that no change to the proposed airspace design was required. For clarity the Options Appraisal will be restated within this document. The airspace design is based upon a segregated portion of Special Use Airspace in the form of a Danger Area, situated towards the Northeast of the UK and activated in support of Large Force Exercises. Minimum dimensions required are 90nm x 160nm laterally and from FL85 to FL660 vertically - predominantly based over the sea but with an overland portion on the shortest edge.*

v. This document uses the most up-to-date and credible data available, with clearly referenced sources, with modelling carried out in line with relevant best practice. Where applicable the Sponsor has explained the associated methodology in order to reach its input and analysis results.

Section 1 – Context

1.1 Current Day Scenario and Civil Airspace Activity. In order to fully inform the Options Appraisal (Phase III – Final) an indication regarding the current-day scenario and the civil airspace activity taking place in the area concerned was a necessity. Given the unpredictable nature of general aviation activity it was determined that an exacting quantitative environmental assessment would not be possible to achieve. However, it was determined that the following data would be useful to inform the Final Options Appraisal and this has been developed further based on the Stage 3 - Consultation:

a) Analyse statistics from the Department for Transport that provides an indication as to commercial air traffic density in the region concerned by this ACP.

b) Monitor general aviation air traffic using electronic conspicuity data[1] that met certain criteria in order to:

i) Provide an indication of the general aviation baseline activity and aircraft behaviour in relation to the preferred design option.

c) Exploit the 'Airspace4All' VFR heatmap and Daily Log Sheet from The Borders Gliding Club to further assess airspace user behaviour in the vicinity of the preferred design option.

d) *Following Consultation with Dundee Airport Limited (4 April 2023), Electronic Conspicuity modelling was conducted using https://globe.adsbexchange.com/?r these statistics did not form part of the initial baseline study submitted under (Phase II – Full), but are included in this document under 3.3 'Options Appraisal' and Appendix D for reference.*

e) *Data regarding the British Hang Gliding and Paragliding Association (BHPA) is included as part of the Baseline Civil Airspace Activity under 3.3 'Options Appraisal' and Appendix D for reference following Stage 3C Consultation. Diagrammatic representation can be found from the BHPA Electronic Conspicuity position paper (August 2022).*

Electronic Conspicuity data sets have been successfully compiled and have been used to inform the development of the environmental assessment and the appraisal of the 'do-nothing' option in order to better determine the suitability of the preferred airspace design.

[1] ADS-B and MLAT

1.2 Option Appraisal

1.2.1 This document forms part of the Airspace Change Proposal document set required for the CAP1616 Airspace Change Process; the Options Appraisal evolves through three phased iterations, with the CAA reviewing the information in the appraisal at each phase. Stage 4A requires the Options Appraisal (Phase II – Full) that was carried out in Stage 3 to be developed further using more rigorous evidence for the preferred design option, compared to the 'do nothing' option. Appendices A, B, C and D are necessary considerations to inform the (Phase III – Final) Options Appraisal, with updates to 3.3 'Options Appraisal' following the Stage 3C - Consultation.

1.2.2 The below table compares the 'baseline' against the preferred design option. Although there is only one proposal alongside the do-nothing option, the Sponsor has earlier considered and discounted a number of options which do not align with the Statement of Need, Design Principles or satisfy the requirements of the Stakeholders. The 'do-nothing' option is described for use as a baseline which informs the WebTag[2] quantitative data, however this baseline option is not considered by the Sponsor to be the preferred choice.

	Option	Description
0	Baseline	The "do nothing" option. Keep everything as it is currently, continue to use existing MDAs. Large Force Exercises will still take place but use MDAs and existing Class G/C airspace.
1	Create new SUA with overland portion.	Create new Special Use Area, predominantly positioned in high seas airspace with overland portions on which ground threats and targets can be positioned.

Option to be progressed:

Stage 3C		***Stage 4B***
Option 0, Do Nothing	**>**	***Option 0, Do Nothing***
Option 1, Special Use Airspace	**>**	***Option 1, Special Use Airspace***

[2] WebTag, the Department for Transport's Appraisal Guidance (May '23 Workbook)

Section 2 – Environmental Information

2.1 Environmental Assessment

2.1.1 The ACP sponsor is the MOD and is, therefore, only responsible for assessing the consequential environmental impact on civil air traffic (CAP1616, B.42). For this reason, the Change Sponsor has not considered the environmental impact of exercise activity in conjunction with this ACP.

2.1.2 The Sponsor suggests that when the preferred option is activated there is no effect on traffic patterns below 7000 feet (Above Mean Sea Level)(AMSL), operations below 7000 feet can still depart on notified Standard Instrument Departures (SIDs) and arrive via Standard Arrival Routes (STARs) both of which are mandated to occur within Controlled Airspace – the Danger Area has been designed in such a way that it is sympathetic to these existing structures. *Following Stage 3 Consultation, there has been no feedback from Stakeholders to oppose this operational assessment made by the Sponsor.*

2.1.3 For a Level M1 ACP the following environmental elements must be assessed and included in the consultation material:

- Noise
- CO2 emissions
- Local air quality
- Tranquillity
- Biodiversity

2.1.4 CAP1616 requires such assessments to include a number of specific metrics in order to derive quantitative output. The MOD has considered the effects on noise, local air quality, tranquillity and biodiversity for the airspace design and has provided a qualitative assessment at *3.3 Options Appraisal*. The MOD has also considered the potential effect on CO2 Emissions and Fuel Burn for the preferred option, this quantitative information can be found at Appendix A and within the enclosed WebTag data (May ’23 Workbook).

2.1.5 Despite the limited quantitative study undertaken, due to the classification of airspace, the Sponsor cannot accurately estimate (beyond the presented Electronic Conspicuity Data) the frequency or type of aircraft flying in the vicinity of the Danger Area or where and at what height they will overfly those on the ground. It is therefore not possible to model noise or conduct other environmental impacts quantitively. As a result, the sponsor was unable to complete analysis as described in:

- CAP 1616a ‘Environmental Technical Annex’
- Options Appraisal of costs and benefits set out in the Air Navigation Guidance
- The ‘WebTag’ quantitative methodology[3] for anything other than network traffic (Appendix A)

[3] WebTAG A3 did not provide useful data due to the majority of the metrics required being unknown

2.1.6 Data gathered on the civil airspace activity (the baseline) can be used to identify trends on aircraft behaviour but does not allow for greater quantitative assessment of the environmental impact of the preferred design option.

Section 3 – Final Options Appraisal

3.1 Operating Principles. The following operating principles will be implemented:

a) Type of Airspace. The Change Sponsor intends to implement the required segregation in the form of a Danger Area, which will provide the most efficient and tactical use of airspace. The MOD will request the airspace structure only as, and when necessary. All activations will be implemented by the UK Airspace Management Cell.

b) Activation Periods. The proposed airspace will not be permanently active; it will only be activated for specific Large Force Exercises that require months in the planning stage, this will enable ample notification to be provided to Stakeholders. Proven procedures (as applied under ACP-2021-048) will be adopted to ensure that the airspace is activated and notified as and when required. This will involve appropriate NOTAM action being taken at least 24-hours in advance. *The proposed Danger Area will not be active over weekends or other notified holiday periods (including bank holidays).*

c) Access to Airspace. Positive control services will be provided to all exercise users of the airspace. Entry and Egress routes will be planned well in advance, published within the Air Control Order, and shared with Stakeholders upon request (a précised version can also be provided to Stakeholders). To ensure minimum disruption to other airspace users a bespoke service will be provided by 78 Squadron (Swanwick Military) to Newcastle and Teesside International Airports for departures and arrivals that would normally route via reporting point CUTEL as aircraft transit to and from the Copenhagen Flight Information Region. This mandated service provision will allow the most expeditious routing for non-exercise traffic. *Consultation was sought on this detail through the associated feedback questionnaire, with modelling carried out with the most up to date, credible data in order to provide an objective assessment. If the preferred design option is implemented a new Letter of Agreement will be required.*

d) Suppression of Adjacent Danger Areas. To assist in the safe and efficient flow of air traffic, the UK Airspace Management Cell will undertake suppression of specified Danger Areas to enable General Air Traffic to flight plan and operate along Conditional Routes, Free Route Airspace and notified Flight Plan Direct Routings. Suppression of these areas shall ensure that they are unavailable for booking by any military agency during activation periods associated with ACP-2020-026.

e) Airspace Management. The UK Airspace Management Cell shall undertake all booking, activation and deactivation activities associated with the preferred airspace design option via the publication of the Airspace Utilisation Plan in addition to associated NOTAMs and once cancellation and hand back of airspace has been undertaken it should not be reversed or amended.

f) Air Traffic Control. 19 and 20 Squadron (RAF Boulmer) are the controlling authority within the proposed Danger Area, and they will work closely with 78

Squadron to ensure that a safe and expeditious service can be delivered to exercise participants and those non-participating aircraft that meet the criteria within any Letter of Agreement.

g) The activation of the proposed Danger Area necessitates changes to a variety of Aeronautical Information Publications which includes ENR 2.1 (FIR, UIR, TMA and CTA), ENR 3.2 (Area Navigation Routes), ENR 4.4 (Name-Code Designators for Significant Points), ENR 5.2 (Military Exercise and Training Areas and Air Defence Identification Zone), ENR 6.7 (Chart of United Kingdom ATS Airspace Classifications – SFC-FL195), ENR 6.8 (Chart of United Kingdom ATS Airspace Classifications – FL195-FL245). All required submission changes of airspace data bound for the UK Aeronautical Information Publication which is not subject to Aeronautical Data Quality Implementing Rule (ADQ-IR) is included within the final submission.

3.2 Safety Assessment. This section provides a brief, qualitative overview of the impact of the preferred option on aviation safety.

3.2.1 A safety assessment was presented with the Stage 2 (Phase I – Initial) and Stage 3 (Phase II – Full) Options Appraisals. It is assessed that the information obtained during consultation supports the underlying assumptions made during Stage 2 and does not change the safety assessment outcomes on the use of segregated airspace in the form of a Danger Area.

3.2.2 The evidence supporting this safety assessment has been obtained through Stakeholder feedback and from the results of previous activations under Temporary Danger Area activation status (most recently ACP-2021-048, March 2023 activations).

3.2.3 Currently, route structures are published and airlines plan to transit via known routes or flight plannable Directs (DCTs). These are deconflicted from active Special Use Airspace where necessary using strategic deconfliction methods and published waypoints. This proposal would introduce a new Danger Area and make some of these waypoints unavailable, necessitating the introduction of alternative routes. This unfamiliarity is a hazard in itself and new procedures may need to be designed and published. There alternate routes are well understood given numerous operations during the temporary activations.

3.2.4 High energy manoeuvres will occur during Large Force Exercises which require segregation from General Air Traffic for the protection of both military exercise traffic and civil aviation, this is the main driver for this proposal and segregated airspace. As part of the design process, the proposal has incorporated a FBZ in addition to a temporal buffer to ensure separation in both time and space. National Air Traffic Service (NATS) are of the opinion that the Flexible Use of Airspace processes, flight plan management and FBZ have been a success during both trials and temporary activations of the Danger Area associated to this proposal and, although this is a new proposal for a permanent danger area, the benefits to safety from using familiar airspace with existing structures and protocols cannot be understated. The SUA, routings and FBZ should be made known to

EUROCONTROL for network visibility reducing the risk of any late notice route changes to aircraft in flight.

3.2.5 The proposed FBZ will be activated by the UK Airspace Management Cell 15 minutes prior to Danger Area activation until 15 minutes after deactivation, via the UK Airspace Usage Plan (AUP), with this FBZ created in direct consultation with NATS.

3.2.6 There is potential for an increase in fast jet traffic taking up Air Traffic Controller workload, infringing controlled airspace or recovering to civil airports in an emergency, but there have been no safety reports of this nature during the temporary activations or previous exercises. It is, however acknowledged by the Sponsor that a robust procedure should be implemented so that traffic routing in and out of the proposed Danger Area is sufficiently deconflicted from commercial operations. Stakeholders will ultimately require a level of assurance regarding entry/exit points in order to conduct their operational activity with minimal disruption, this requirement will be a mandated operational procedure specified within the Letter of Agreement.

3.2.7 This proposal should also provide Stakeholders with a guaranteed level of service if usual routes cannot be flown. This service offering should be captured within a bespoke Letter of Agreement and if for whatever reason the level of service cannot be provided the Danger Area would not be activated. This level of certainty will assist with predictability and ensure the safe provision of transit traffic.

Air Safety Information Management System Analysis

3.2.8 The Sponsor received *nil* direct feedback regarding any safety related aspects of the preferred design option utilising ACP-2021-048 (Future Combat Airspace – Interim Solution 2022-2023) to inform this safety assessment.

3.2.9 Interrogation of the Air Safety Information Management System was therefore conducted by the Sponsor, with all related Defence Air Safety Occurrence Reports (DASORs) analysed.

The following criteria were utilised:

Date Range – Year to Date from 8 May 22 to 8 May 23

Brief Title – TDA597 and TDA EGD597 and Ex Cobra Warrior and Ex Storm Warrior

Filters – nil applied

During the study period, **6 DASORs** were submitted that met the above criteria.

3.2.10 *2 reports* related to the same incident (ATC/aircrew poor communication – 20 March 2023), this incident did not relate to the proposed design of airspace, robust operating procedures specified within the Letter of Agreement should help to prevent such instances.

3.2.11 *1 report* related to a non-exercise typhoon that was denied an air traffic service due to military air traffic controller capacity levels (20 March 2023). This

incident was not as a result of the proposed airspace design and implementation of the preferred design option will not subsequently remedy a similar incident from occurring.

3.2.12 *1 report* related to issued avoiding action for a pair of Typhoons (16 March 2023) against a civil transit aircraft whilst outside of the TDA EGD597 – the perceived severity of this incident was described as low by the author. The Investigation/Findings/Recommendations have not yet been published; however the Sponsor would suggest that this incident could have occurred irrespective of the Danger Area in use.

3.2.13 A single incident (18 August 2022) was observed which referred to a loss of standard separation whilst exercise traffic was outside of segregated airspace and routing back to home station following an exercise in TDA EGD597 – at the closest point the Typhoon was 4000 feet vertically separated from civil traffic (but was not however subject to co-ordination). This incident could have occurred irrespective of the airspace design.

3.2.14 The final report (18 August 2022) observed that met the filter criteria above related to the incorrect pressure setting when within the danger area – referred to as the ‘Force QNH.’ The report refers to a high cockpit workload for the crews distracting them from the briefed procedure. The pressure setting was subsequently corrected following 20 minutes of manoeuvring within the danger area. Vertical separation against other exercise participants was stated to be ‘not less than 600 feet’ during this time. This incident is not related to airspace design and could have been witnessed in any other danger area. The applied vertical criteria within the danger area ensured that vertical separation from other exercise participants was maintained and due to segregated airspace, there was no impact on external stakeholders.

3.3 Options Appraisal *These Tables were based on CAP1616 Fourth Edition, Table E2. The Sponsor has provided a table for the preferred design option. Note that the combined baseline 'do-nothing' scenario is included for comparison purposes only.*

Group	Impact	Level of Analysis	Baseline 'do-nothing'	Preferred Design Option (Danger Area)
Communities	Noise impact on health and quality of life	Qualitative	Noise levels are expected to remain unchanged from present state. Existing danger areas in this vicinity (D323/613) are entirely over the high seas area and therefore traffic routing to and from these exercise locations is anticipated to be at or above a minimum of 7000 feet unless the aircraft have planned to conduct operational low flying (which is not part of this consultation).	CAP 1616 states that for aircraft above 7000', the prioritised environmental impact is CO2 emissions, and an assessment of noise impact is not normally required. This proposal has the base of the Danger Area at FL85, this has been designed in order to reduce any noise impact from participating military aircraft, the Sponsor would also like to emphasise that the majority of the Danger Area is positioned over the high seas area in order to reduce any possible noise impact. As exercise participants proceed towards the exercise area, they will normally be configured in such a way to be not below FL85, therefore minimising any noise impact. It is understood that the second order effects on civil traffic should be taken into account therefore targeted engagement took place with those airports in the affected area with the direct question "will this proposal affect your traffic patterns below 7000'?" There were no quantitative responses indicating that there will be any change resulting from this proposal. It is possible that some routes will be affected, the distance between the proposed Danger Area and those airports affected is great enough that standard arrival and departure profiles can still be flown within existing controlled airspace structures. In accordance with the requirements laid down in CAP2091, the sponsor anticipates no or negligible change to the noise effects on the ground.
Communities	Air quality	N/A	As per present activity there would be no change due to altitude criteria of 1000 feet.	In accordance with CAP1616, para B72 this assessment is not required because the proposal will not affect emissions below 1000 feet.

Wider society	Greenhouse gas impact	Monetise and quantify	Opportunities to reduce the impact of Greenhouse gas would be missed as aircraft in the cruise would not be able to take advantage of the proposed shorter routing across the UK. Certain Stakeholders may permit arrivals/departures outside of controlled airspace which may however offer an unquantifiable fuel saving.	This proposal would create a portion of segregated airspace which would have to be avoided, this will result in extra miles being flown on some routes when it is active. However, this is outweighed by the addition of a protocol prohibiting the concurrent activation of other Danger Areas, this would make some more direct routes between the UK, Europe and North Atlantic available. Quantitative Greenhouse Gas calculations have been made using WebTag (May 23 workbook)(period 2023 – 2033) and a positive network benefit is forecast (Appendix A provides exacting details). Quantitative calculations over a 10-year appraisal period indicate that a saving of 12,817 tonnes will be made, with the opening year saving 1,055 tonnes.
Wider society	Capacity/resilience	Qualitative	The advantages associated with an increase in network capacity could not be harnessed if the baseline 'do-nothing' option were to remain.	There is not expected to be any impact on Wider society. Although routes for some passenger flights may be disrupted, other routes would be available, and each activation is for a pre-notified, specific time period. Given the forecast reduction in track mileage it is anticipated that greater capacity within the network can be achieved.
General Aviation	Access	Qualitative	Operations would continue as present using existing Danger Area structures, however as mentioned by the Sponsor these areas are not of sufficient size in order to carry out Large Force Exercises and whilst there may be greater access for General Aviation the uncertainty of carrying out these exercises in airspace that is not segregated will likely create greater uncertainty and therefore compromise safety for all airspace users.	Newcastle International Airport have raised concern over this proposal as it has the possibility to affect their traffic, particularly routing to/from the Southeast. Edinburgh Airport have commenced their own ACP, in addition the Sponsor is aware of proposals regarding the Scottish TMA and the Firth of Forth ACPs for controlled airspace. It is expected that the MOD will establish a procedure for notifying activations well in advance so that deconfliction and appropriate notification can be provided. Routes affected will not be closed, but alternative routes will be proposed. With the majority of the Danger Area being located over the high seas area, with a base level of FL85 there will be minimal impact on Visual Flight Rule traffic given that analysis of ADS-B data shows that the majority of this activity occurs below 3000 feet AMSL. The Borders Gliding Club previously expressed a desire to be contacted early in the notification process regarding the Danger Area,

				effective lines of communication have been established with this Stakeholder group during Stages 1 and 2. *Further analysis using Electronic Conspicuity modelling for Dundee Airport was conducted with the results displayed at Appendix D.4 of this submission. The Sponsor assesses that the overall access impact to Dundee is negligible, and the Sponsor is keen to continue an engagement relationship with Dundee to ensure any impacts remain low.* *Consultation with the British Hang Gliding and Para Gliding Association (BHPA) was conducted and whilst tangible statistics could not be provided to the Sponsor it was determined that with the majority of BHPA operations conducted to between 6500-7000AGL the Danger Area would not limit the access for this Stakeholder group.*
General Aviation/ commercial airlines	Economic impact from increased effective capacity	Quantitative	The 'do-nothing' baseline option is less expeditious for transit traffic crossing the UK and therefore there may be a detrimental economic impact if there is no change (Appendix A)	This concept was not designed with the intention of increasing the capacity of this region of airspace, however trial data has suggested that there may be a benefit in terms of reduced track distance for aircraft that cross the UK. In addition proposed enhanced Airspace Management may increase the availability of routes along the East coast. Modelling using STATFOR and NATS forecasts indicate that in 2023, 4230 transit aircraft can take advantage of a shorter route (Appendix A – Figure 7).
General Aviation/ Commercial airlines	Fuel burn	Monetise	A quantitative saving in fuel burn could not be harnessed if the 'do-nothing' option were to be employed. It is noted that for some immediate Stakeholders there may be a fuel saving if more expeditious routings could be followed, however the Sponsor argues that this would be significantly offset by traffic in the cruise.	The forecast number of aircraft likely to be inconvenienced by the activation of the Danger Area is expected to be significantly lower than those aircraft crossing the UK that are due to experience a net benefit in CO2 Emissions. It is noted that the segregation of a large volume of airspace will undoubtedly add extra track miles to some routes. The Overall Assessment Score, Net Present Value of CO2 equivalent emissions of the proposal £833,163. The Net Present Value of Traded Sector CO2 equivalent emissions is £683,951 (WebTag workbook May 23)

				An assessment is made at Appendix D.1 regarding the maximum number of potentially impacted Newcastle International Airport commercial flights based upon the STATFOR and NATS forecasts. In the absence of a commercial operator forecast, the Sponsor conducted Electronic Conspicuity modelling of the Sep 2022 activations of EGDXXX and determined that only 3 aircraft during the entire September activation period required a re-route.
Commercial airlines	Training cost	N/A	N/A	No additional training was identified by the commercial airlines.
Commercial airlines	Other costs	N/A	N/A	There are no other known costs which would be imposed on commercial aviation.
Airport/ANSP	Infrastructure costs	N/A	N/A	There would be no costs associated with infrastructure.
Airport/ANSP	Operational costs	Qualitative	N/A	Once established through Deployment costs the Sponsor offers that there would be no longer term Operational Cost associated with the operation of the Danger Area.
Airport/ANSP	Deployment costs	Monetise and quantify	If the 'do-nothing' option was continued it could be stated that a cost saving in both capital and resources could be made, however given that a number of the associated costs have likely already been absorbed during previous activations of the exercise airspace, the Sponsor would argue that providing a tangible figure for the exact operational costs would be difficult to quantify.	It is likely that training will be required for air traffic controllers at certain regional airports and at the Area Control Centres (Prestwick and Swanwick) in order to safely implement new procedures associated with the preferred airspace design. SIDs and STARs are unlikely to be affected given that the proposed Danger Area does not impinge on the route network. It is anticipated that there is likely to be some monetary cost in the design of the airspace structure. In addition there are likely to be workforce hours spent in creating and promulgating the changes. Procedures for the infrequent departures/arrivals which would normally route through the affected airspace must be changed. A considerable amount of money and workforce hours have gone into the design for temporary activations, the Sponsor suggests that this previous work

				can be used as a basis for the permanent solution in order to minimise costs to ANSPs. The Sponsor is aware of a requirement to amend the current naming convention of the preferred design option. For previous implementations and the establishment of 'TDA EGD597' the cost to NATS was approximately £130,000 – this cost allowing for system regression testing to take place. NERL En-Route indicate that Rough Order of Magnitude Costs are indicating £40,000 to implement a Permanent Airspace Change. An early informal discussion with Newcastle International Airport indicates that the cost could be circa £8,000 to include map adaptations, documentation, training plan and sim updates, the Sponsor thinks that it is reasonable to assume that given the previous activations and knowledge of the required process this estimate would be fairly accurate. *Dundee Airport did not provide a quantifiable cost but stated that updates would be required to documentation.*

Section 4 - Conclusion

4.1 Summary and Preferred Design Option. The Change Sponsor has just one preferred airspace design, which is the design proposed at Stage 3; it consists of the design displayed below. The vertical extent of the Danger Area is proposed to be FL85 to FL660, with the airspace covering lateral dimensions of approx. 160 x 90nm.

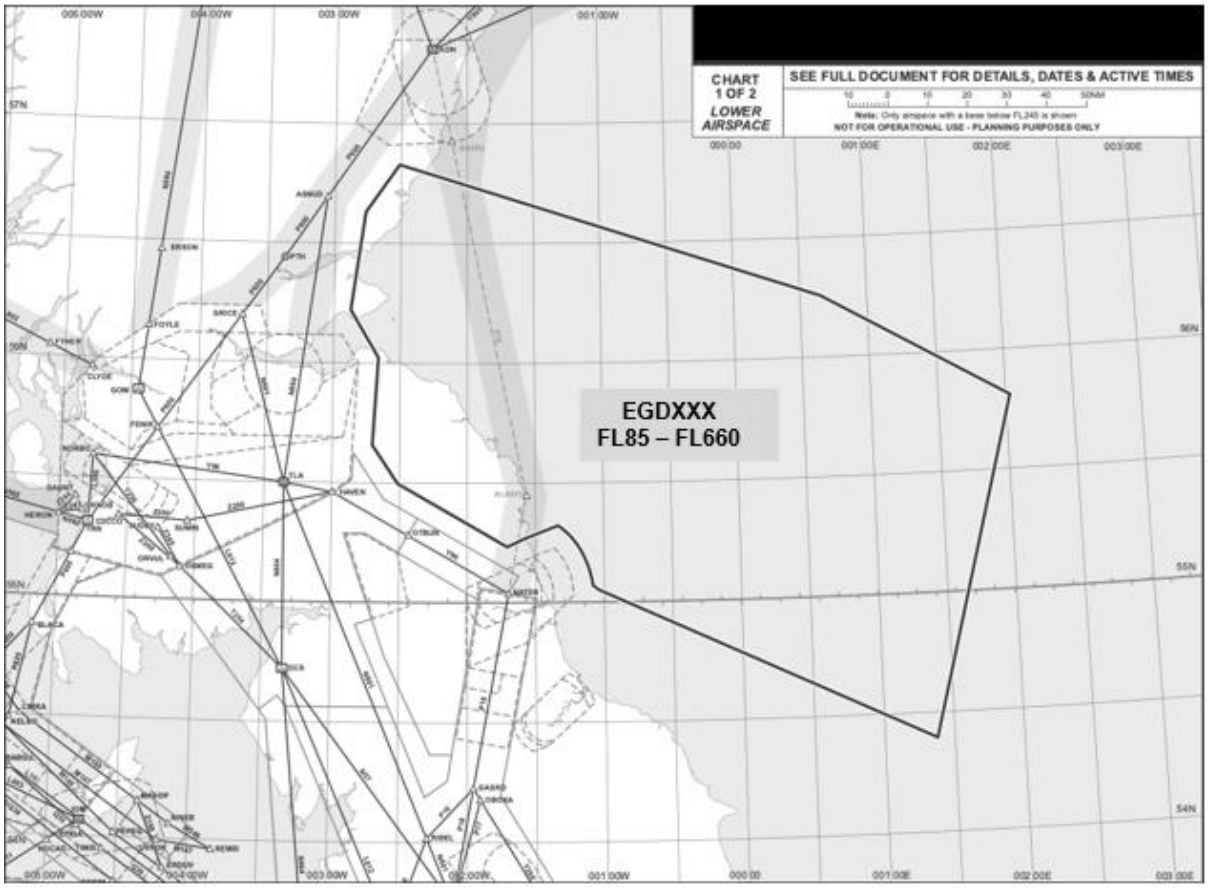


Figure 1, EGDXXX – Lower ATS Routes (North Sheet)

4.1.1 Building on the Initial Options Appraisal the Sponsor concludes that this Danger Area remains the preferred option. It is assessed that it will have only a limited impact on a small number of Key Stakeholders – yet overall there will be a net benefit to the network in terms of CO2 Emissions.

4.1.2 The Do-Nothing (baseline) option does not satisfy the Design Principles agreed in Stage 1 and does not provide sufficient airspace in order to conduct the Large Force Exercises as described within the Statement of Need.

4.1.3 The Change Sponsor proposes that since the impact on other airspace users is assessed to be low and that there are benefits to the environment; further attempts to provide quantified or monetised analysis would be disproportionate and provide little if any additional clarity for Stakeholders.

4.1.4 The lateral extent of the proposed Danger Area is defined by the below co-ordinates

EGDXXX Point A	561522.0091N	0003907.5792E
EGDXXX Point B	554828.3171N	0020147.5592E
EGDXXX Point C	542336.8487N	0012224.6980E
EGDXXX Point D	550309.6454N	0010229.1251W
EGDXXX Point E	550418.6752N	0010502.8039W
ARC Centre	550216.5200N	0014123.3200W
EGDXXX Point F	551920.1891N	0012006.5646W
EGDXXX Point G	551609.6637N	0013433.3562W
EGDXXX Point H	551426.4483N	0014100.0384W
EGDXXX Point I	551402.9632N	0014228.5294W
EGDXXX Point J	552951.7065N	0023046.9369W
EGDXXX Point K	553928.3441N	0024211.5167W
EGDXXX Point L	560121.5366N	0023945.4024W
EGDXXX Point M	561317.0166N	0025226.3416W
EGDXXX Point N	563754.0691N	0024600.5643W
EGDXXX Point O	564943.6576N	0023058.8126W
EGDXXX Point A	561522.0091N	0003907.5792E

4.1.5 Additional co-ordinates for the associated Flight Plan Buffer Zone are defined below – these coordinates require submission (UK Aeronautical Information Publication which is subject to the Aeronautical Data Quality Implementing Rule (ADQ-IR)).

EGDXXXZ Point A	561955.4146N	0004252.0974E
EGDXXXZ Point B	555153.9614N	0020853.7461E
EGDXXXZ Point C	554846.9201N	0021107.6136E
EGDXXXZ Point D	542003.3899N	0012939.0748E
EGDXXXZ Point E	541805.3570N	0012216.5063E
EGDXXXZ Point F	545851.4440N	0010700.5120W
EGDXXXZ Point G	550148.6195N	0011335.6583W
ARC Centre	550216.5200N	0014123.3200W
EGDXXXZ Point H	551337.5504N	0012146.7774W
EGDXXXZ Point I	551133.9998N	0013108.0005W
EGDXXXZ Point J	550954.9997N	0013719.0011W
EGDXXXZ Point K	550825.5211N	0014255.7560W
EGDXXXZ Point L	552605.9989N	0023654.9989W
EGDXXXZ Point M	553804.9992N	0025110.9991W
EGDXXXZ Point N	560008.0010N	0024849.0007W
EGDXXXZ Point O	561214.4031N	0030145.0802W
EGDXXXZ Point P	563946.7766N	0025440.0618W
EGDXXXZ Point Q	565354.7506N	0023645.0242W
EGDXXXZ Point R	565458.2490N	0023110.3455W
EGDXXXZ Point A	561955.4146N	0004252.0974E

4.1.6 The following CAP1616 indicative timeline is anticipated by the Sponsor (agreed 20 Dec 2022)

Planned Date	Event as per CAP 1616
21 Jul 2023	Stage 4 - Update and Submit
17 Nov 2023	Stage 5 - Decide
Feb 2024	Stage 6 - Implement

Appendix A – Environmental Impact Assessment (NATS Analytics)

NATS Analytics were requested to produce an Environmental Impact Assessment, with the output being derived from the following assumptions:

- 32 activations per year (based on planned activations for 2023)
- EGD323 and EGD613 are simultaneously active
- Fuel impact of this change would occur at cruise
- 124 flights per activation period
- 0900 – 1300 UTC identified as most common activation time

Simulated baseline air traffic models have been produced using NEST (v1.8) and emissions figures produced using BADA 4.2 data, made available by the European Organisation for the Safety of Air Navigation (EUROCONTROL).

The traffic sample was taken from the 2205 AIRAC from EUROCONTROL. This AIRAC was chosen in order to provide a reasonable mid-point in traffic numbers, between the two expected activation periods of March and August/September. A 2022 AIRAC was required to give an up-to-date baseline set of traffic that was not considerably impacted by the COVID-19 pandemic.

The following 4 days were picked to simulate: 20/05/2022, 28/05/2022, 06/06/2022 and 08/06/2022. These 4 days were picked to give a good overall representation of traffic, with the following factors considered: Weekday, Traffic count and City pair flows. The traffic sample is defined as any flight whose simulated trajectory changed due to the activation of EGDXXX or the deactivation of EGD323 and EGDA613.

Traffic included must have crossed the Traffic Filter Region (TFR) during the sample days above. The TFR is a modified version of the London/Scottish FIR/UIR, reduced to remove flights with trajectories which would not be impacted by the danger areas of interest.

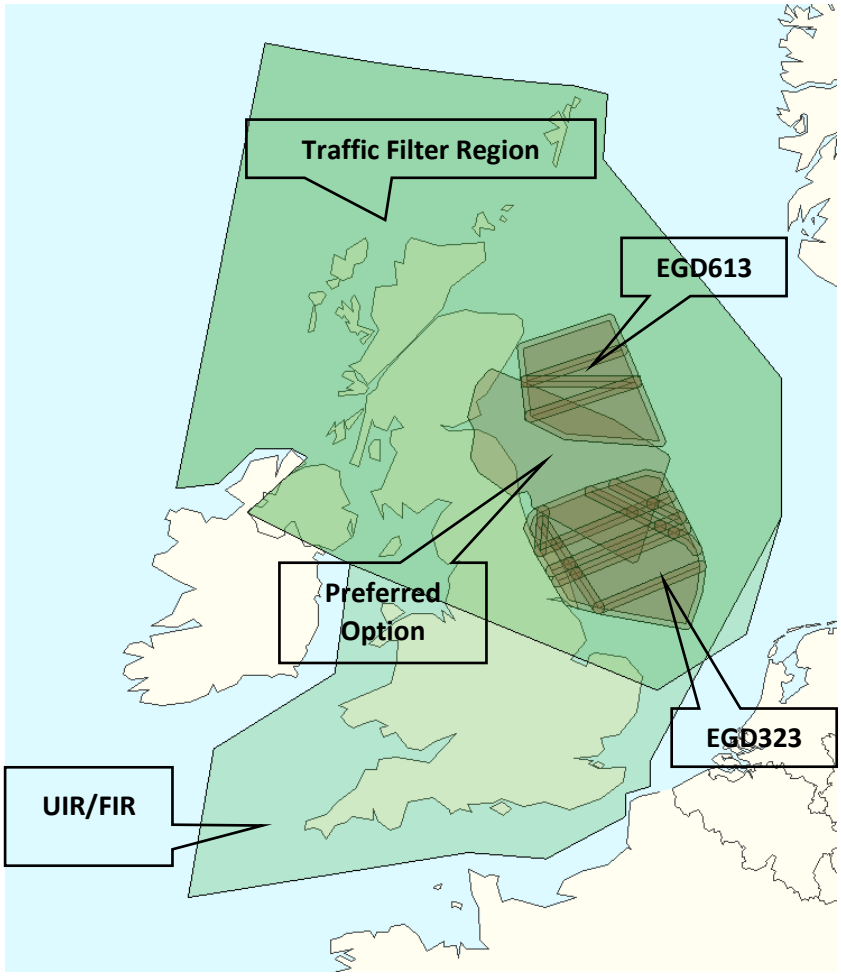


Figure 2, Traffic Filter Region NATS Analytics

A.1 Effect on Aviation

Due to the proximity of the danger areas to the eastern edge of the London/Scottish FIR/UIRs, many flights need to change their UK entry/exit point between the Baseline and Scenario simulations in order to produce a valid flight plan. Therefore, the trajectories were simulated within the Simulated Region, with the entry and exit points matching those from the initial flight plan.

The Simulated Region is an artificial piece of airspace created for this study, matching the London/Scottish FIR/UIR on the Atlantic boundaries, but expanding across European airspace. This fixes the Oceanic UK Entry/Exit point for any transatlantic flights, ensuring that the North Atlantic Tracks are utilised in a realistic manner.

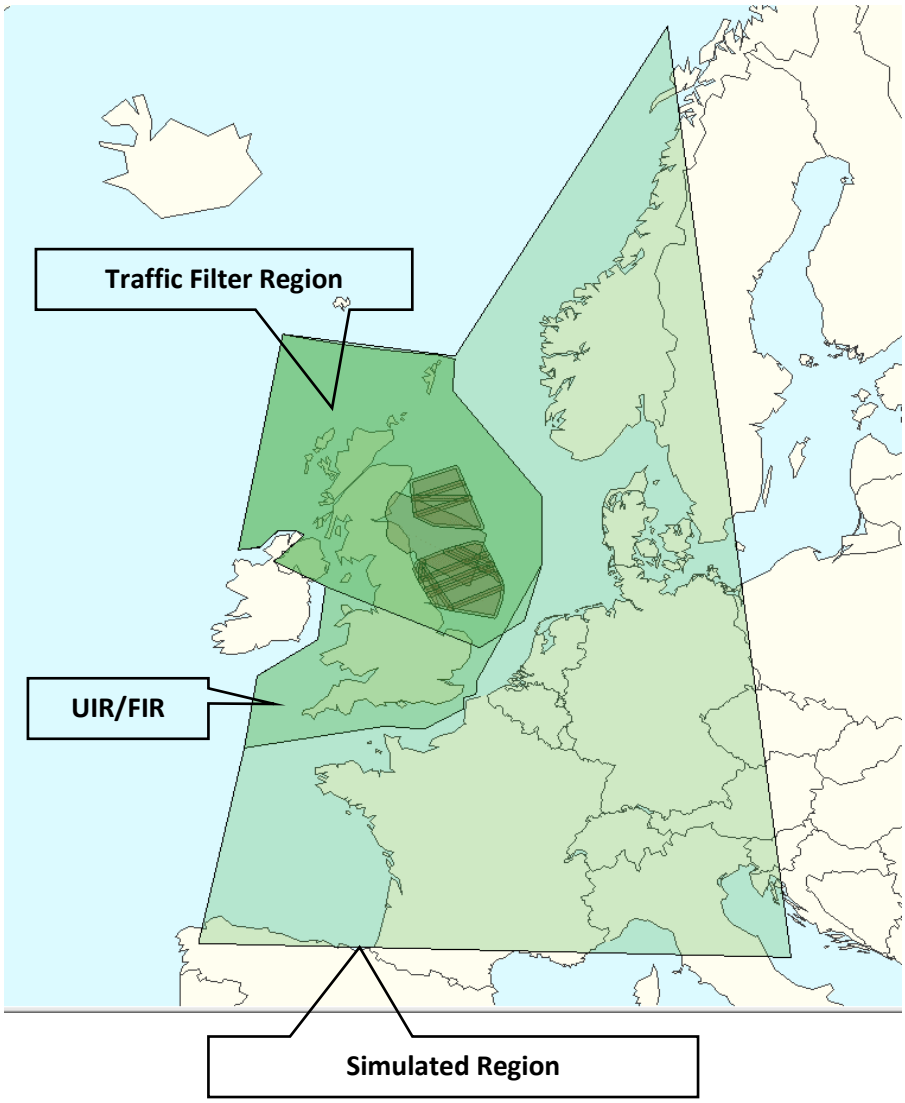


Figure 3, Simulated Region for sample study NATS Analytics

The image below shows an example pair of Baseline (red) and Scenario (green) trajectories. The green dots mark the points where the flight enters or exits the UK FIR.

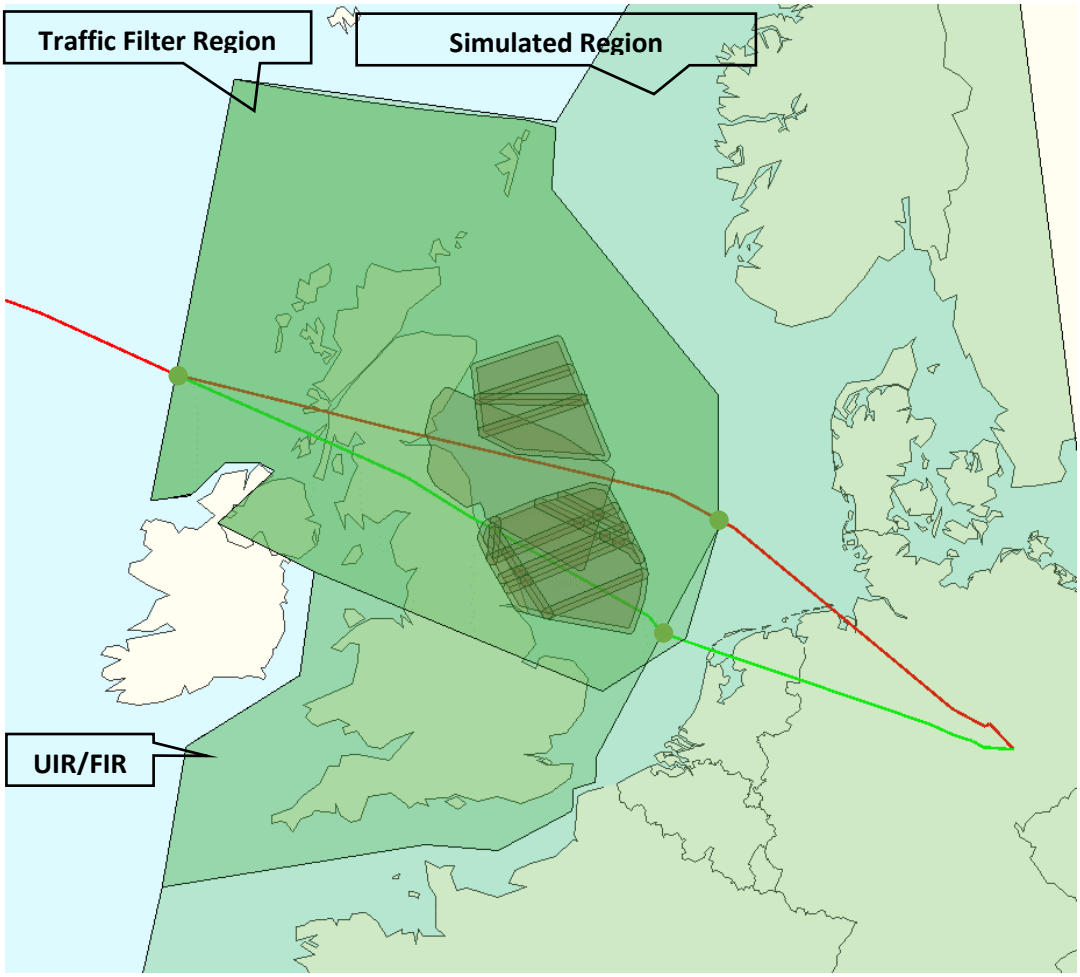


Figure 4, projected flight profile during various simulated scenarios NATS Analytics

In the Scenario, where the EGD323 complex is not active, the flight can take a shorter route across the London/Scottish airspace.

A.2 Environmental Impact

Method - the track distance flown was taken from the Baseline and Scenario models and used to calculate the change in distance flown. The fuel burn at cruise by aircraft type was then taken from the BADA 4.2 PTF tables and used to calculate the fuel burn change based on the change in distance flown.

The traffic was used to represent an activation of EGDXXX and the number of activations have been scaled to represent an annual benefit (32 activations per year assumed based on the number of activations planned in 2023).

Traffic was grown using the October 2021 STATFOR forecast and NATS forecast when STATFOR was not available, to estimate the annual impact to 2033 (10 years post deployment).

The table below shows the estimated impact of the change within UK airspace for the 10 years following implementation.

Civil Flights within UK FIR			
Year	Traffic	Fuel Impact (Tonnes)	CO_2e Impact (Tonnes)
2023	4230	-332	-1,055
2024	4412	-346	-1,100
2025	4474	-351	-1,115
2026	4541	-356	-1,132
2027	4609	-361	-1,149
2028	4678	-367	-1,166
2029	4748	-372	-1,184
2030	4819	-378	-1,202
2031	4892	-384	-1,220
2032	4965	-389	-1,238
2033	5039	-395	-1,256

Figure 5, estimated impact of change within UK airspace (over 10 years). Positive fuel numbers indicate additional contribution (penalty), negative numbers indicate lower contribution (benefit)

The analysis suggests that fuel burn and CO2e emissions will decrease as a result of this change.

Assumptions have been made to fix the many variables which impact the estimated benefit. Therefore, the observed benefit may change considerably if these assumptions such as the number, length and time of activations do not hold true.

A.3 Average Results

The average route length, fuel burn and carbon dioxide equivalent (CO2e) emissions per flight are given in the table below. The average flight has a reduced track distance subsequently lowering the fuel burn and emissions.

Average per Flight from 2022 4 day Sample	Average Track Distance within UK FIR (NM)	Average Fuel Burn within UK FIR (Kg)	Average CO_2e within UK FIR (Kg)
Baseline	417.28	3,730.6	11,863.2
Scenario	408.21	3,652.2	11,613.9
Difference	-9.07	-78.4	-249.3

Figure 6, 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

A.4 Annual Environmental Impact

The table below shows the annualised impact of this change in terms of fuel burn and CO2e emissions for years 2023 – 2033.

Civil Flights within UK FIR							
Year	Traffic	Baseline Fuel Burn (Tonnes)	Scenario Fuel Burn (Tonnes)	Fuel Impact (Tonnes)	Baseline CO_2e (Tonnes)	Scenario CO_2e (Tonnes)	CO_2e Impact (Tonnes)
2023	4,230	15,780	15,448	-332	50,180	49,126	-1,055
2024	4,412	16,458	16,113	-346	52,338	51,238	-1,100
2025	4,474	16,689	16,338	-351	53,071	51,955	-1,115
2026	4,541	16,939	16,583	-356	53,867	52,735	-1,132
2027	4,609	17,193	16,832	-361	54,675	53,526	-1,149
2028	4,678	17,451	17,084	-367	55,495	54,329	-1,166
2029	4,748	17,713	17,341	-372	56,327	55,143	-1,184
2030	4,819	17,979	17,601	-378	57,172	55,971	-1,202
2031	4,892	18,248	17,865	-384	58,030	56,810	-1,220
2032	4,965	18,522	18,133	-389	58,900	57,662	-1,238
2033	5,039	18,800	18,405	-395	59,784	58,527	-1,256

Figure 7, positive numbers indicate additional contribution (penalty), negative numbers indicate lower contribution (benefit).

A.5 Greenhouse Gases Workbook (*WebTag May 23 workbook*)

Greenhouse Gases Workbook - Worksheet 1

Scheme Name:	ACP-2020-026
Present Value Base Year	2010
Current Year	2023
Proposal Opening year:	2023
Project (Road/Rail or Road and Rail):	road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£):	£833,163

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): (between 'with scheme' and 'without scheme' scenarios)	-12,817
Of which Traded	-5777.996646
Change in carbon dioxide equivalent emissions in opening year (tonnes):	-1,055

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £683,951

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	-2502.538528
Non-traded sect	0	0	0	-3048.497302

Qualitative Comments:

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):	£1,249,745
Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):	£416,582

A.6 Cost Benefit Analysis Table (*WebTag May 23 workbook*)

Emission valuations												
Price adjustment												
		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
GDP deflator		133.3	135.8	137.3	138.7	141.0	144.2	147.5	150.9	154.4	157.9	161.6
CO2e values price base	2010											
GDP deflator index - base	100											
Price base for outputs	2010											
GDP deflator index - for outputs	100											
Price base adjustment	1.00											
Carbon values in 2010 prices												
low (£/tCO2e)		102.1	103.6	105.2	106.8	108.4	110.1	111.7	113.5	115.2	116.9	118.7
central (£/tCO2e)		204.1	207.2	210.4	213.6	216.8	220.1	223.5	226.9	230.4	233.9	237.4
high (£/tCO2e)		306.2	310.8	315.6	320.4	325.3	330.2	335.2	340.4	345.5	350.8	356.1
Valuing changes in emissions (non-tradec												
positive values represent a benefit - a re												
Low (£)		59109.7	62590.2	64433.0	66395.4	68417.6	70501.4	72648.7	74861.3	77141.3	79490.8	81911.9
Central (£)		118219.3	125180.5	128866.0	132790.8	136835.2	141002.8	145297.3	149722.6	154282.7	158981.7	163823.7
High (£)		177329.0	187770.7	193299.0	199186.3	205252.9	211504.2	217946.0	224583.9	231424.0	238472.5	245735.6

Figure 8 – Net Community Benefit (CO2 Emissions) Non-Traded

Figure 8 indicates the Net Community Benefit (non-traded) based on CO2 Emissions over a 10-year forecast regarding the implementation of the SUA. The forecast indicates that the *Central* Valuing Changes in Emissions (non-traded) will increase from £118,219.30 (2023) to that of £163,823.70 by the year 2033.

Emission valuations												
Price adjustment												
		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
GDP deflator		133.3	135.8	137.3	138.7	141.0	144.2	147.5	150.9	154.4	157.9	161.6
CO2e values price base	2010											
GDP deflator index - base	100											
Price base for outputs	2010											
GDP deflator index - for outputs	100											
Price base adjustment	1.00											
Carbon values in 2010 prices												
low (£/tCO2e)		102.1	103.6	105.2	106.8	108.4	110.1	111.7	113.5	115.2	116.9	118.7
central (£/tCO2e)		204.1	207.2	210.4	213.6	216.8	220.1	223.5	226.9	230.4	233.9	237.4
high (£/tCO2e)		306.2	310.8	315.6	320.4	325.3	330.2	335.2	340.4	345.5	350.8	356.1
Valuing changes in emissions (traded) (£)												
positive values represent a benefit - a re												
Low (£)		48523.7	51380.9	52893.6	54504.6	56164.6	57875.2	59637.9	61454.3	63326.0	65254.7	67242.2
Central (£)		97047.3	102761.8	105787.2	109009.2	112329.3	115750.5	119275.9	122908.6	126652.0	130509.5	134484.4
High (£)		145571.0	154142.7	158680.9	163513.8	168493.9	173625.7	178913.8	184362.9	189978.0	195764.2	201726.5

Figure 9 – Net Community Benefit (CO2 Emissions) Traded

Figure 9 indicates the Net Community Benefit (Traded) based on CO2 Emissions over a 10-year forecast regarding implementation of the Danger Area. The forecast indicates that the *Central* Valuing Changes in Emissions (traded) will increase from £97,047.30 to £134,484.40 by the year 2033.

Appendix B - Environmental Assessment

B.1 Noise

The Change Sponsor has assessed that it is highly unlikely that the proposed change will result in an increase in the number of aircraft operating above any residential areas - given that the main exercise area is predominately above the high seas area (with only a minimal section overland). It is acknowledged that there may be a requirement for certain aircraft to route around the preferred design option in order to avoid any restrictions, however the proposed Danger Area has been designed in such a way that any possible impact on Stakeholders is as sympathetic as possible. Due to the classification of airspace in which VFR traffic will operate the Sponsor cannot accurately estimate the frequency or type of aircraft routing around the Danger Area or where and at what height they will overfly certain areas. It is therefore not possible to model noise or other environmental impacts quantitively for any general aviation flight.

The Change Sponsor considered whether it would be possible or indeed useful to provide operational diagrams of civil air traffic patterns to compare likely changes between the baseline scenario and the proposed implementation of the preferred design option. The MOD feels that it would be difficult to produce accurate and useful operational diagrams for future traffic patterns and that there would be minimal benefit in doing so and the associated output would be disproportionate based on the quantifiable elements completed by the analysis of the STATFOR and NATS forecast.

From the qualitative assessment conducted using the ADS-B traces it was noted that the average operating altitude of the general aviation traffic was well below the base level proposed. The Change Sponsor assumes therefore that there will not be a resultant change in the number of aircraft operating beneath the Danger Area, nor will the aircraft types be altered. The same amount and type of noise is likely to impact the local population as is currently experienced. The Sponsor does not believe that the activation of the Danger Area will change the behaviour of this general aviation traffic.

B.2 CO2 Emissions

The Sponsor is keen to demonstrate that there are benefits associated with the implementation of the Special Use Airspace in relation to CO2 Emissions.

The Department for Transport, Air Navigation Guidance 2017 provides *Altitude Based Priorities* with a focus on the reduction of aircraft emissions at or above 7000 feet. This guidance also encourages Stakeholders to subscribe to the Government's aim of reducing aviation fuel use by seeking to promote the most efficient use of airspace and the expeditious flow of air traffic including procedures that allow for direct routings.

Quantitative CO2 Emission calculations regarding the activation of the preferred airspace design have been made in support of this application. *In summary, the*

analysis indicates that fuel burn and CO2 emissions will decrease as a result of this airspace change proposal being successfully implemented. Emission figures have been produced using BADA data, made available by the European Organisation for the Safety of Air Navigation (EUROCONTROL).

Quantitative data suggests that there is a saving of over 9 nautical miles for each flight at cruise that utilises the more expeditious trajectory. This reduction in track mileage translates to a saving of 78.4kg of average fuel burn and a reduction in average CO2 Emissions of 249.3kg.

The traffic sample was then grown using the October 2021 STATFOR[4] (EUROCONTROL) forecast (and NATS forecast when STATFOR was not available) to estimate the annual impact to 2033 (10 years post deployment). Positive fuel numbers indicate additional contributions (penalty), negative numbers indicate lower contributions (benefit).

Civil Flights within UK FIR			
Year	Traffic	Fuel Impact (Tonnes)	CO_2e Impact (Tonnes)
2023	4230	-332	-1,055
2024	4412	-346	-1,100
2025	4474	-351	-1,115
2026	4541	-356	-1,132
2027	4609	-361	-1,149
2028	4678	-367	-1,166
2029	4748	-372	-1,184
2030	4819	-378	-1,202
2031	4892	-384	-1,220
2032	4965	-389	-1,238
2033	5039	-395	-1,256

Considering the ADS-B assessment of general aviation traffic it is assumed that because these airspace users typically operate well below the base level of the Danger Area there will be no impact upon their behaviour and associated CO2 Emissions. Any attempt to quantify CO2 Emissions will not be possible due to the freedom associated with the classification of airspace. The Sponsor has assessed that any general aviation CO2 Emissions changes will be negligible.

B.3 Local Air Quality

Air quality must be considered by change sponsors if the proposed airspace change is likely to:

> *Bring about a change in aviation emissions (by volume or location) below 1000 ft, and the location of the emissions is within or adjacent to an identified Air Quality Management Area (AQMA).*

[4] EUROCONTROL working with stakeholders to produce a shared forecast of future network traffic, to help planners understand and manage risks.

Given that the proposed Danger Area is based upon vertical dimensions that has a lower limit of FL85 and an upper limit of FL660 it is assumed that Local Air Quality will remain unaffected by this proposal. For this reason the MOD feels that air quality does not fall in scope of this ACP.

B.4 Tranquillity

The Sponsor suggests that the number of powered aircraft transiting through the area should not change as a result of the preferred Danger Area. The consequential impact of noise due to any additional airspace has therefore been determined as negligible. In order to minimise the effect of noise on local communities the Sponsor is conscious of Design Principle (Priority 3) which seeks to minimise environmental impacts (including noise).

B.5 Biodiversity

CAP1616 requires Change Sponsors to consider the effects of new airspace on biodiversity. Similarly to the noise modelling requirement, the Sponsor proposes that formal assessment of the effects on biodiversity is out of the scope of the airspace change proposal. Due to the negligible change in traffic patterns and traffic increases associated with the preferred airspace design option, the Sponsor has assessed that there will be no noticeable change to biodiversity and a formal assessment would be disproportionate to the number of aircraft affected. No specific sensitive or locally identified areas have been identified by Stakeholders.

Appendix C - NPV Calculation of Monetised Deployment Costs

Rough Order of Magnitude Costs have been obtained from a number of Stakeholders related to ACP-2020-026. These monetised figures are extracted from 3.3 Options Appraisal *ANSP Deployment costs.*

The below GDP figures have been generated using GDP Growth Rate Calculator (omnicalculator.com) and an assumed 2% GDP growth rate

Year	0	1	2	3	4	5
Nominal Terms (£)	178,000	178,000	178,000	178,000	178,000	178,000
Real terms (year 0 prices)(£)	178,000	174,510	171,088	167,733	164,444	161,219

Appendix D - Baseline Aviation Activity

Statistics taken from the Department for Transport (Air Traffic by service, operation type and airport 2010 – 2020), indicates that for aircraft landings and take-offs Edinburgh is the fifth busiest UK airport (handling 126,400 movements in 2019), Aberdeen is the 10th busiest (handling 76,100 movements), Newcastle is ranked 14th (handling 39,700), Durham Tees Valley handled 3,500 and Dundee handled 1,200.

Air transport movements (Aircraft landings and take-offs. thousands)	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
All traffic by airport:											
Aberdeen	88.0	94.8	98.8	99.9	106.1	95.7	80.0	81.9	77.5	76.1	45.8
Edinburgh	100.6	105.1	102.9	103.8	101.4	107.2	115.6	121.8	123.8	126.4	42.6
Newcastle	47.0	44.6	43.7	43.0	42.9	42.1	42.5	43.9	41.5	39.7	11.7
Dundee	3.6	2.8	2.7	1.4	1.2	1.2	1.4	1.2	1.2	1.2	0.7
Durham Tees Valley	5.6	5.1	4.2	4.3	4.0	3.9	3.7	3.9	3.6	3.5	-

Figure 10, Statistics taken from Department for Transport and Civil Aviation Authority, Air Traffic at UK airports (AVI01)

D.1 Newcastle International Airport. Figure 11 provides an indication as to how the preferred Danger Area is approximately positioned in relation to Newcastle International Airport. Aircraft both to and from Newcastle using the network structure can still utilise existing Standard Instrument Departures and Standard Arrival Routes which proceed through Newcastle controlled airspace – marked approximately with the red and blue arrows. Any Newcastle traffic using the route network should not therefore be subject to a change in traffic pattern below 7000 feet.

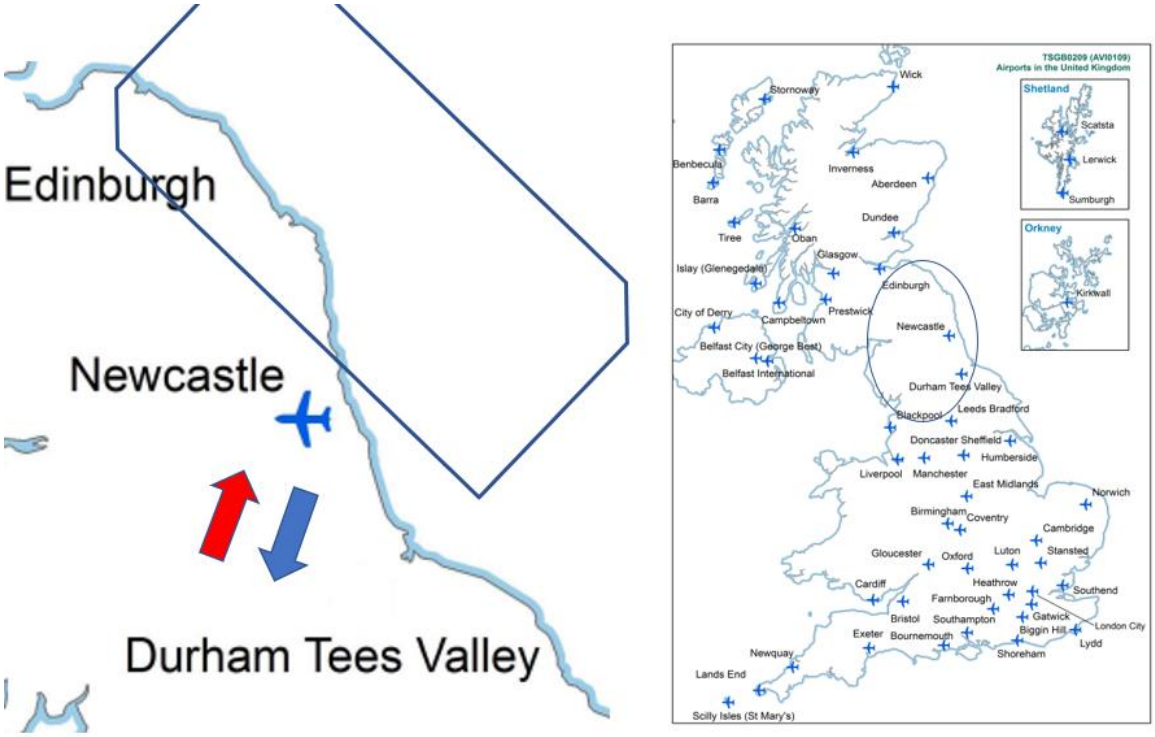


Figure 11, approximate position of preferred design in relation to Newcastle International Airport

It is acknowledged that for certain arrivals and departures, following these exacting instrument profiles may not be overly expeditious and therefore airlines may elect to fly on a more direct route or air traffic controllers will offer a routing that is more efficient for any flight profile that does not necessarily fit this requirement.

The impact of the preferred design option on Newcastle Airport was therefore assessed to understand the current-day scenario and civil airspace activity. The following criteria were used: EUROCONTROL NEST (v1.8), define the set of relevant flights as all initial flight plans in AIRAC 2205 (19 May 2022 – 15 June 2022) which meet the following criteria:

• Arrive at or depart from Newcastle International Airport

• Fly through or below the preferred airspace design option

• Estimate the number of relevant flights impacted by a possible activation, by calculating the number of flights which enter the preferred airspace within a 4-hour rolling window* e.g. 00:00 – 03:59, 01:00 – 04:59, 02:00 – 05:59, … 20:00 – 23:59

• Take the maximum number of impacted flights across all 4-hour windows in AIRAC 2205 to calculate the maximum possible impact of a single activation of the Danger Area.

Maximum Number of Impacted Flights per Activation	5

The maximum number of impacted flights per annum was calculated based on the assumption of 32 activations per year (historic norm).

The maximum number of impacted flights per annum were then grown using the October 2021 STATFOR forecast and NATS forecast when STATFOR was not available, to estimate the annual impact to 2033 (10 years post deployment).

Year	Max Impacted Newcastle Traffic per Annum
2023	171
2024	178
2025	180
2026	183
2027	186
2028	189
2029	191
2030	194
2031	197
2032	200
2033	203

Based on this quantitative assessment (using AIRAC 2205) the Sponsor acknowledges that a small proportion of Newcastle traffic will potentially be impacted by the preferred design option, however it is not possible to quantifiably determine whether this change will impact upon traffic patterns below 7,000 feet.

D.2 General Aviation Activity. A report generated by *Airspace for All* (October 2018) identified that a Visual Flight Rule Significant Area of Interest was located between Edinburgh and the Angus East Coast, activity that includes flight training, aircraft rental, hang-gliding, parachuting, aerial surveying, police and helimed flights. It was also highlighted that this area is used by traffic transiting on the East Coast to/from central Scotland and North-east England and it may be the only option to avoid high ground of the Southern Uplands and associated cloud bases. The image below highlights the usage of the airspace by General Aviation in Class G airspace. The darker colours representing greater levels of aerial activity.

Figure 12, FASVIG VFR significant areas

In order to qualitatively assess the level of baseline Visual Flight Rule activity in this region and in relation to the preferred Danger Area, analysis of ADS-B Exchange - track aircraft live (adsbexchange.com) was conducted by the Sponsor. The following criteria were employed:

- Source: ADS-B, MLAT, Mode-S

- Lateral limit of assessment: Preferred Danger Area (+5nm lateral buffer)
  i) Area 1, overland area from 56 to 57 degrees North
  ii) Area 2, overland area from 55 to 56 degrees North
  iii) Area 3, remaining lateral limit of preferred design over high sea area

- Altitude: Surface level to FL195 (any aircraft above this level are within Class C airspace).

- Date: 8 – 12 Aug 2022 and 15 – 19 Aug 2022 (2-week period, discounting weekends and 18 August as this date corresponds with the activation of Danger Area associated with ACP-2021-048).

- Time: 0900 – 1300 UTC (to align with most common activation periods).

- Aircraft criteria: General Aviation movements that met this criterion were annotated (irrespective of the fact that certain callsigns were observed on multiple occasions). Baseline civil movements that routed to/from Newcastle were discounted as they were captured in the above analysis. Gliders were discounted from this analysis.

The Sponsor selected dates that did not correspond with any activations of the preferred design option (based on TDA EGD597) as it was important to assess traffic intensity/movements that were not subject to any restrictions/notifications of Danger Area activity.

The following observations were made based on the employed criteria:

Criteria	Number
Total number of general aviation movements observed across assessment period	329 aircraft
Average number of daily general aviation movements across entire area of interest	36.5 aircraft
Average number of daily general aviation movements identified within area 1	24.5 aircraft
Average number of daily general aviation movements identified within area 2	7.3 aircraft
Average number of daily general aviation movements identified within area 3	4.4 aircraft
Average altitude of general aviation movements (all areas)	4000 feet (above mean sea level)

General Aviation Assessment, it must be noted that the lateral extent covered by the preferred design option (when using the +5nm lateral buffer criteria is significant) and irrespective of this vast area the Sponsor deduces that the number of general aviation movements is relatively low (average of 36.5). The region of St Andrews, Dundee and Perth experienced the highest number of movements, with a noticeable paucity of traffic along the Northumberland coastline to the region South of Newcastle. Given that the average operating altitude of those general aviation movements observed was 4000 feet, significant freedom is afforded to these airspace users when the base level of the Danger Area is set at FL85 and it could therefore be argued that very little restriction is placed upon these operators.

D.3 Gliding Areas

This proposal has the potential to affect VFR pleasure flying, particularly gliding. Borders Gliding Club (identified in the below diagram by the green oblong) routinely operating up to FL 245.

Understanding the exact intensity of gliding activity in the region is difficult given the flexible nature of the profession. Borders Gliding Club has approximately 120 members of which 40 – 50 operate routinely. The British Gliding Association (BGA) 'Ladder' provides only a very approximate indication of the total activity from this location, entries on the Ladder must meet certain height and distance criteria and therefore training and pleasure flights will not be added to this record, *using the BGA Ladder is not therefore a fair representation for this study.*

Qualitative feedback from the Borders Gliding Airspace and Liaison Officer indicates that operations occur only on Fridays, Saturdays and Sundays; on average there can be 15 – 20 flights a day, with a maximum recording of 37 flights on one particular day (figure 5), however these numbers do not include the aircraft tug that is used to launch each glider. The intensity of the activity at Borders Gliding Club is identified in the below heatmap, the main area of intensity depicted by the green oblong, with a dispersal of traffic as you proceed further from the epicentre.

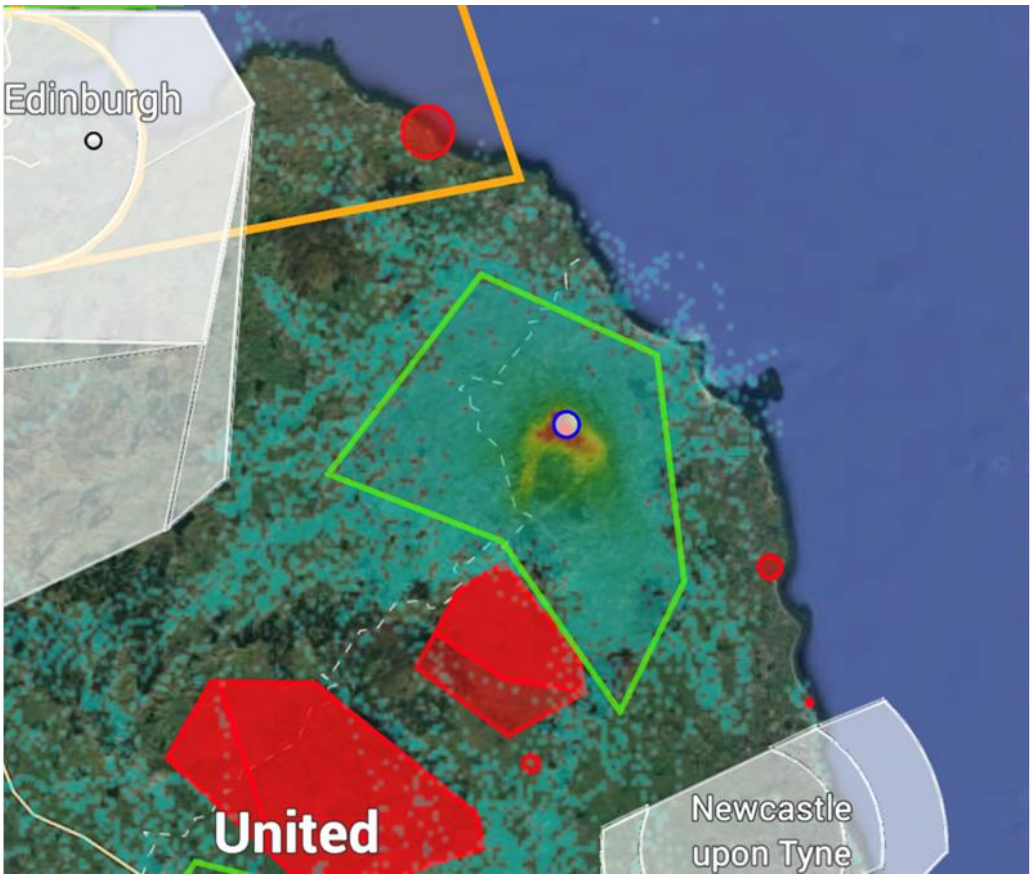


Figure 13, Borders Gliding Club activity heatmap VFR significant areas

BordersGliding Club

Members | Webcam | Weather | Pilot Briefing | Local Tasks | Charges

HOME CLUB FORUM DAILY LOGSHEETS PILOT LOG MEMBER ACHIEVEMENTS

Daily Logsheets: Monday Tuesday Wednesday Thursday Friday Saturday Sunday

25/10/2022	3	GF		790	G-EFER	10:54	14:03	3000	03:09
25/10/2022	4	TB	PH	JZ8	G-BJCI	10:56	11:22	2000	00:26
25/10/2022	5	PG		JTO	G-BJCI	11:08	11:19	2500	00:11
25/10/2022	6	RA		JTP	G-EFER	11:10	12:10	3000	01:00
25/10/2022	7	SB		19X	G-BJCI	11:18	11:43	3000	00:25
25/10/2022	8	SF	RH	291	G-BJCI	11:32	15:31	2500	03:59
25/10/2022	9	TB		FVP	G-EFER	11:38	15:36	3000	03:58
25/10/2022	10	RS		RS	G-BJCI	11:44	12:00	3000	00:16
25/10/2022	11	SG		FWM	G-EFER	11:52	12:03	2500	00:11
25/10/2022	12	MC	GG	EF	G-BJCI	12:02	14:45	2500	02:43
25/10/2022	13	DC		F20	G-EFER	12:04	13:00	1500	00:56
25/10/2022	14	WS	XM	JAD	G-BJCI	12:16	12:58	2500	00:42
25/10/2022	15	TB	PH	JZ8	G-BJCI	12:31	12:40	1500	00:09
25/10/2022	16	BA		137	G-BJCI	13:10	14:10	2500	01:00
25/10/2022	17	JS	BW	JZ8	G-BJCI	13:10	13:55	2500	00:45
25/10/2022	18	AP		AP	G-EFER	13:18	16:08	3000	02:50
25/10/2022	19	DM		FFS	G-EFER	13:30	14:40	3500	01:10
25/10/2022	20	RB	RH	KA	G-BJCI	13:37	16:14	3000	02:37
25/10/2022	21	RH		S2	G-EFER	13:53	15:20	3000	01:27
25/10/2022	22	WS	SG	JAD	G-BJCI	14:06	15:09	3000	01:03
25/10/2022	23	DC		F20	G-EFER	14:06	15:30	3000	01:24
25/10/2022	24	JR		546	G-CKIU	14:09	14:58	3000	00:49
25/10/2022	25	TB	AE	A34	G-BJCI	14:18	14:50	2000	00:32
25/10/2022	26	CS		CKL	G-EFER	14:20	15:25	2500	01:05
25/10/2022	27	KA		TL2	G-CKIU	14:23	14:49	3000	00:26
25/10/2022	28	DW		EDJ	G-EFER	14:34	15:33	2500	00:59
25/10/2022	29	RS		RS	G-CKIU	14:37	15:00	2500	00:23
25/10/2022	30	BS		KJ8	G-BJCI	14:37	16:17	2500	01:40
25/10/2022	31	CD		CD	G-BJCI	14:46	15:18	3000	00:32
25/10/2022	32	PG		JTO	G-EFER	15:05	16:27	3000	01:22
25/10/2022	33	SG		FWM	G-BJCI	15:09	15:26	2000	00:17
25/10/2022	34	TB	PH	JZ8	G-BJCI	15:21	15:21	C/B	00:00
25/10/2022	35	GR	RW	JAD	G-BJCI	15:42	16:01	2500	00:19
25/10/2022	36	TB	PH	JZ8	G-BJCI	15:53	15:53	C/B	00:00
25/10/2022	37	PH		JAD	G-BJCI	16:26	16:44	2000	00:18

Figure 14, Borders Gliding Club Daily Log Sheet (25 Oct 2022)

D.4 ADS-B Exchange Data for Dundee International Airport

Sample period, 10 independent activations of TDA EG D597(9 Aug – 15 Sep 2022). Acknowledged that modelling has occurred against ACP-2021-048 TDA EGD597, it is assumed that these activations will provide an accurate indication against Dundee traffic for ACP-2020-026.

9 Aug 2022 (2000 – 2315 UTC), 11 Aug 2022 (2000 – 2315 UTC), 18 Aug 2022 (0800 – 1115 UTC), 23 Aug 2022 (0800 – 1115 UTC), 25 Aug 2022 (0800 – 1115 UTC), 5 Sep 2022 (0900 – 1300 UTC), 7 Sep 2022 (0900 – 1300 UTC), 9 Sep 2022 (0900 – 1300 UTC), 13 Sep 2022 (0900 – 1300 UTC), 15 Sep 2022 (0900 – 1300 UTC).

Sample obtained using ADS-B and MLAT

Traffic, total 23 Dundee IFR movements (both arrivals/departures during sample period)(based on the approximate profile flown; the Sponsor has determined that some IFR movements conducted a visual approach.

Average of 2.3 movements per activation (combination of both arrivals and departures)(during above sample period)

Average of 0.3 departures from RW09 during TDA EG D597 activation periods (during above sample period)

Average of 0.7 arrivals to RW27 during TDA EG D597 activation periods (during above sample period)

VFR traffic not included (captured under previous ADS-B study) and under VFR Significant Area of Interest

*Note, Dundee advised that traffic levels are increasing to historic norms (supporting statistical data from Dundee would be beneficial for the Sponsor).

D.5 British Hang Gliding and Parachuting Association Activity

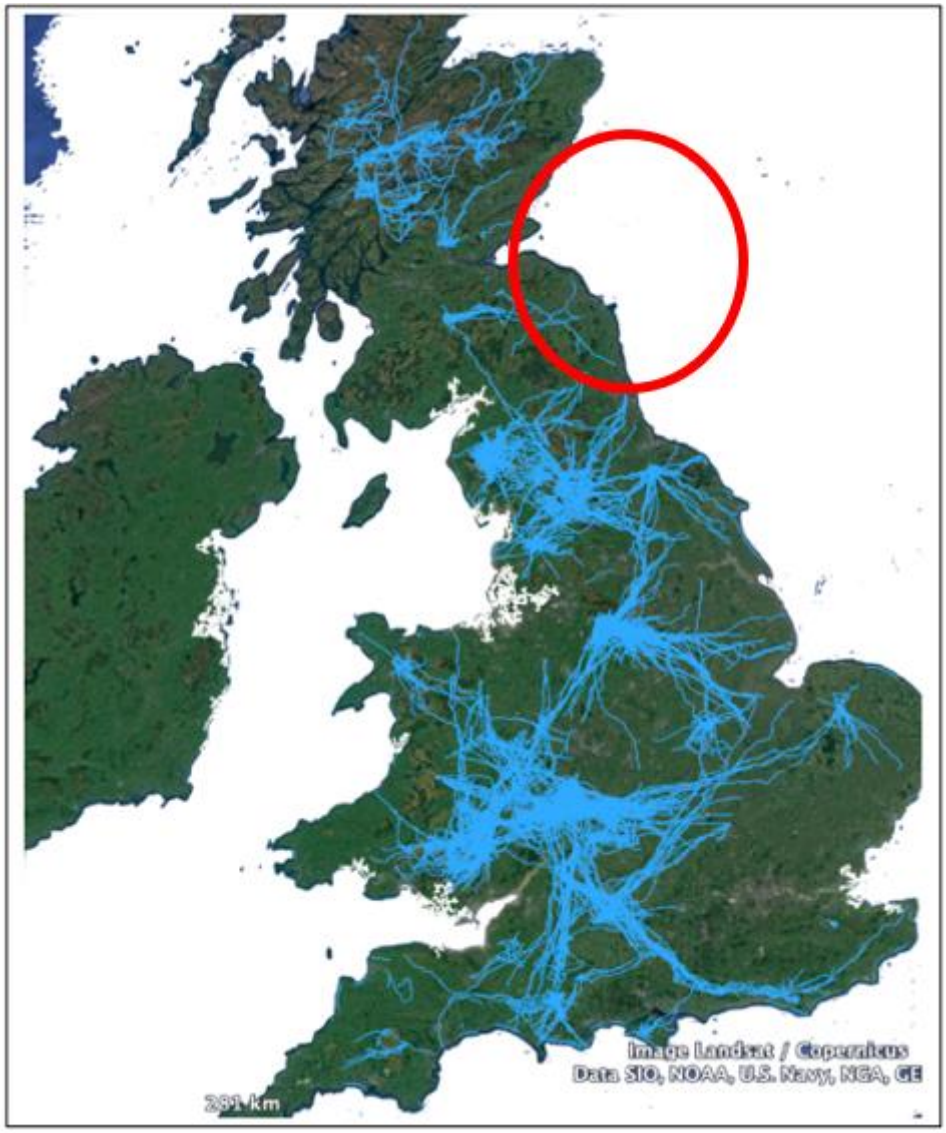


Figure 15, BHPA Electronic Conspicuity Paper 2022

BHPA Electronic Conspicuity position paper August 2022 – paraglider (unpowered) cross country flights in Great Britain in a typical year. Each line representing a flight route annotated to the above figure. The red circle represents the area of interest associated with ACP-2020-026.

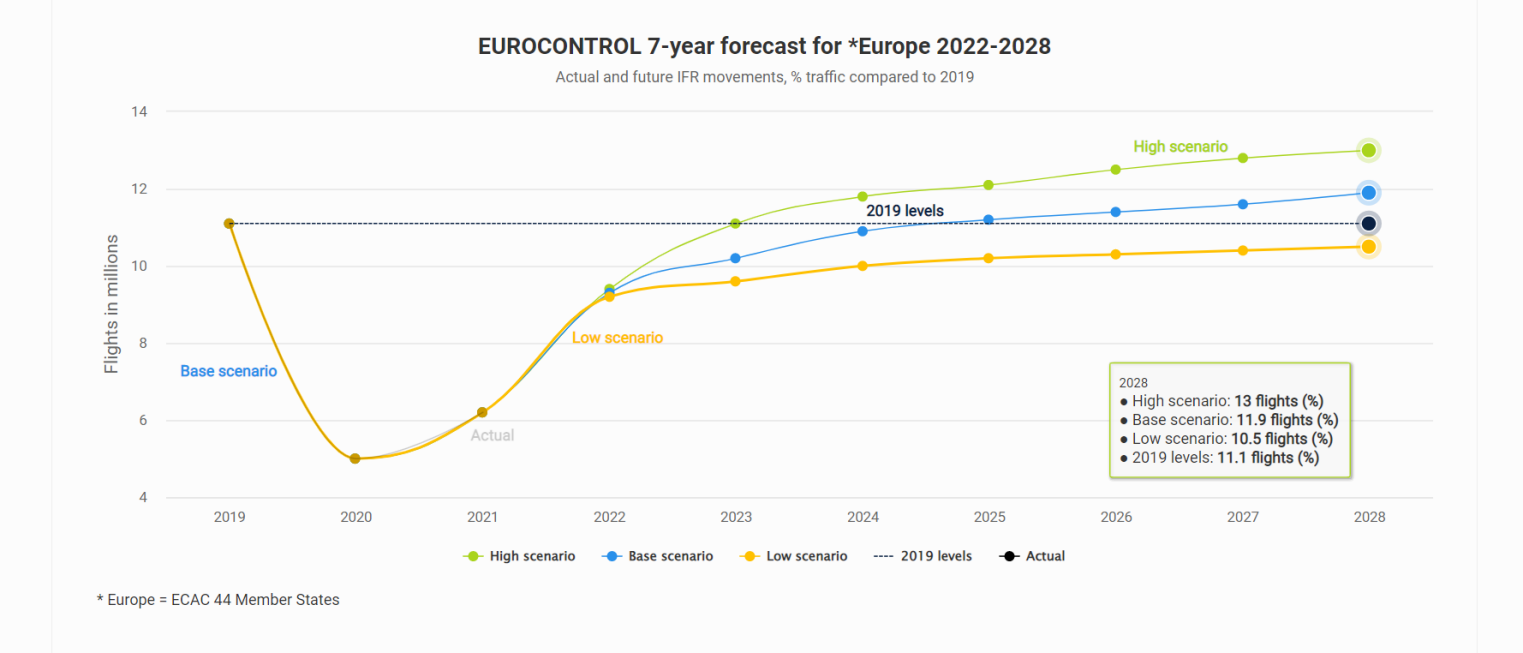
Consultation with the BHPA states that most activity occurs between ground level and cloud base; with a maximum average altitude of between 6500 – 7000 feet (above mean sea level), with the base level of the preferred design option of Flight Level 85 it is unlikely that a conflict of interest will occur.

Whilst the above figure suggests that minimal activity occurs laterally in relation to the preferred design option it is acknowledged that the overlaid GPS traces may only actually represent half of the actual BHPA flights.

D.6 Traffic Forecast (civil airspace users)

The traffic forecast for the quantitative Environmental Impact Assessment (NATS Analytics)(Appendix A) was grown using the October 2021 STATFOR forecast and NATS forecast when STATFOR was not available, to estimate the annual impact to 2033 (10 years post deployment).

Detail taken from Medium-term forecasts | EUROCONTROL is presented below and shows the relative difference between the high/base/low scenario in terms of flight growth.



Tangible traffic forecasts for the general aviation sector are more difficult to acquire and the Sponsor would suggest that given the data derived by ADS-B and the associated behaviour of the general aviation community an increase in traffic would have little impact on the preferred design given the average altitude of operations within this sector.